First Five-Year CERCLA Review of Seven Pearl Harbor Naval Complex National Priorities List Sites

JOINT BASE PEARL HARBOR-HICKAM, OAHU, HAWAII

PHNC National Priorities List Site

September 2014

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH HI 96860-3139

Comprehensive Long-Term Environmental Action Navy
Contract Number N62470-11-D-8013, CTO KB12

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Prepared for:

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Prepared under:

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EXECUTIVE SUMMARY

This five-year review evaluates whether the remedies implemented for seven land use control (LUC) sites on the island of Oahu remain protective of human health and the environment.

The due date for this five-year review is driven by the signature date of the earliest decision document for the seven sites. The Building (Bldg.) 284 and Former Bldgs. 80 and 302 Record of Decision (ROD) was signed by the Navy on 29 September 2009, triggering the completion date for this five-year review. The next five-year review will be due five years from the Navy's signature date in accordance with Navy policy (DON 2011). This five-year review has been completed in accordance with the United States Environmental Protection Agency (EPA) *Comprehensive Five-Year Review Guidance* (2001) and with the Department of the Navy *Policy for Conducting Five-Year Reviews* (2011). The Navy is the lead agency in this five-year review and is responsible for conducting the five-year review, preparing the five-year review report, and submitting the report for regulatory review and comment. The Navy will ensure that recommendations and any actions or follow up identified during the five-year review are addressed. This five-year review report is consistent with Navy procedures and reviews, and has been executed by the Navy.

SITES REVIEWED

The seven sites under five-year review (Figure ES-1) in this report are located at Joint Base Pearl Harbor-Hickam on Oahu, Hawaii. The seven sites are part of the Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) site under the EPA Comprehensive Environmental Response, Compensation, and Liability Act Information System Number HI4170090076. Executive Order 12580 (EO 1987) authorizes the Navy, as the lead agency, to conduct environmental response actions at Navy sites. Each site was investigated separately and a ROD document issued for each site. The seven sites are undergoing their first five-year review in this report and they are reviewed collectively here to synchronize the process for five-year reviews for PHNC NPL LUC sites. The seven sites are listed in Table ES-1.

Table ES-1: Seven PHNC NPL LUC Sites Undergoing Five-year Review

Navy Site Name	Navy Site Location	EPA OU	EPA OU Name
Ford Island Landfill	Ford Island	05	Ford Island Landfill
Bldg. 284 and Former Bldgs. 80 and 302	Ford Island	12	Ford Is. HazSites (Sans LF)
Various Transformer Sites (TD-10, K-14 and W-4/W-5)	TD-10 [Ford Island], K-14 [Halawa Main Gate], W-4/W-5 [Waipio Peninsula]	01	Sitewide
Shoreline Site Northwest of Dry Dock #3	Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility [PHNSY & IMF]	06	NSY Dry Dock #3
4th Street Coral Pit	West Loch Annex	24	West Loch 4th St. Coral Pit LF
Former Pearl City Junction	Pearl City	14	Pearl City Junction
Bldg. 6	PHNSY & IMF	17	NSY Bldg. 6, Former Foundry

OU operable unit

Documents provided prior to September 2013 were evaluated for this five-year review report. Documents available after that date were included in this report only if they contained information that significantly impacted a current site remedy; otherwise, those documents will be evaluated during the next five-year review. In addition, the risk evaluation was conducted using May 2013 regional screening levels (EPA 2013), the most current screening criteria available as of September 2013.

An overview of the seven sites is presented in Table ES-2. For each site, all relevant activities that have been performed, as well as data and documents that have been generated since implementing the various remedial actions, have been reviewed. Site inspections and interviews with relevant personnel have been recorded.

REVIEW RESULTS

For all seven sites undergoing review, the Technical Assessment evaluated whether:

- The remedy is functioning as intended.
- The assumptions used at the time of remedy selection remain valid and the remedial action objectives are still appropriate.
- Any other information was identified that calls into question the protectiveness of the remedy.

Recommendations are provided where necessary to close any data gaps and improve the effectiveness of the remedial actions in protecting human health and the environment. The Issues, Recommendations and Follow-up Actions, and Protectiveness Statements for each site are summarized in the Five-Year Review Summary Form, which follows this Executive Summary.

Figure ES-1
Location of Seven NPL LUC Sites
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

Table ES-2: Overview of Seven PHNC NPL LUC Sites Undergoing Five-Year Review

Description	Date of Decision Document	COCs Remaining on Site at Issuance of Decision Document		Selected Remedy
		Medium	Constituent(s)	
Ford Island Landfill				
The Ford Island Landfill was used from the mid-1930s until the late 1960s for disposal activities that involved dumping and burning wastes generated by maintenance activities performed on Ford Island. After the aforementioned disposal activities were discontinued, bulk debris was disposed of and covered with soil until these activities were also discontinued in 1982. When the Navy discontinued landfill dumping, they covered approximately 80 percent of the landfill with a final layer of soil.	27 September 2011 [a]	Soil	Antimony, arsenic, cadmium, copper, lead, zinc, Aroclor-1260, benzo(b)fluoranthene, benzo(a)anthracene, benzo(a)pyrene, dibenz(a,h)anthracene	LUCs (including long-term monitoring and landfill containment system [vegetative cover, irrigation system, and concrete drainage trench] maintenance)
		Groundwater	Arsenic, copper, mercury, nickel, zinc	
		Surface Water	Copper, lead, mercury, nickel	
Bldg. 284 and Former Bldgs. 80/302				
Bldg. 284 was built in 1946 and was used as an aviation engine test cell facility. An unpaved sloped area northwest of Bldg. 284 contained exposed metal and concrete construction debris. In 2006, a permeable vegetative soil cap and shoreline revetment was built over the metals-containing soil to prevent direct exposure to human and ecological receptors and to deter erosion of soil fill into the harbor. Bldgs. 80 and 302 were built sometime prior to 1942 and used as a garage and vehicle maintenance area. A two-phase TCRA was completed in 2005 through 2006 to excavate surface soil containing elevated metals concentrations and consolidate this soil on site under a 2-foot-thick vegetative soil cap in the grassy area east of Independence Street.	29 September 2009 [b]	Soil	Building 284: Antimony, arsenic, cadmium, copper, lead, mercury, zinc Former Buildings 80/302: Antimony, arsenic, cadmium, chromium, copper, lead, selenium, silver, thallium, zinc	LUCs (includes maintenance and inspection of the cap, and long-term monitoring of groundwater at Bldg. 284)
Various Transformer Sites				
Previous investigations at these transformers identified PCB-contaminated soil and concrete. A NTCRA was conducted to remove PCB-contaminated soil from the site, however PCB-contamination exceeding cleanup standards still remains at the sites. TD-10 is an inactive transformer located inside Bldg. S181, near the intersection of Yorktown Boulevard and Wasp Boulevard, within the Ford Island geographical study area (GSA). The concrete area at TD-10 containing PCB contamination was double-painted with epoxy encapsulant. K-14 is an active transformer in Bldg. S485, located south of Kuahua Avenue and adjacent to Bldg. 445, within the Halawa-Main Gate GSA. PCB-contaminated soil was covered with clean soil and an asphalt cap. W-4/W-5 is located off of Waipio Point Access Road and includes two active outdoor pad-mounted transformers, W-4 and W-5, which are co-located and considered a single site. PCB-contaminated soil was covered with clean soil, a gravel cap, and enclosed with a locked fence.	23 September 2010 [c]	Concrete, soil	PCBs	LUCs (including encapsulated concrete [site TD-10]), clean, backfilled soil and asphalt [site K-14]; and clean, backfilled soil and gravel cap [site W-4/W-5])

Description	Date of Decision Document	COCs Remaining on Site at Issuance of Decision Document		Selected Remedy
		Medium	Constituent(s)	
Shoreline Site Northwest of Dry Dock #3				
Initial investigations concluded that potential human health risk at the Shoreline Site existed because of the presence of asbestos. As a result, the Navy performed a TCRA, removing the ACM-containing soils down to a 1 percent asbestos fibers cleanup goal. During the removal, the Navy observed cement kiln bricks and weathered asbestos-containing cloth buried roughly 3 to 5 feet below ground surface. Residual ACM less than 1 percent in subsurface rubble may still pose a human health threat to worker health and result in other possible human exposure if redevelopment is allowed in the future. Therefore, a concrete cap was installed to minimize the potential for asbestos at the site to become airborne.	14 July 2010 [d]	Soil	Asbestos	LUCs (including concrete cap and long-term maintenance)
4th Street Coral Pit				
In the 1930s, the site was excavated as a source of coral for use as road construction materials. During World War II, the Coral Pit was used as a waste disposal site for solvent cans, paint sludges, paint cans, empty transformers, acid-filled automotive batteries, and dunnage (NEESA 1983). The Coral Pit was partially backfilled with coral rock by the U.S. Army Corps of Engineers in the mid 1970s to preclude further disposal of potentially hazardous materials. Subsequent to covering the old Coral Pit, scrap metal disposal was permitted at the site, although unauthorized disposal of other materials reportedly continued (NEESA 1983). The site remained undeveloped after its closure, and the current Coral Pit surface remains approximately 3 to 7 feet below the surrounding grade. The types of waste observed at the 4th Street Coral Pit during the remedial investigation consisted predominantly of scrap metal, construction debris, and other inert or non-hazardous waste. A remedial investigation found arsenic detected above residential and industrial screening levels within surface soil across the site. Therefore, arsenic was identified as the primary chemical of concern at the 4th Street Coral Pit. A feasibility study was performed to address the former solid waste disposal area and chemical of concern at the 4th Street Coral Pit using the presumptive remedy approach (AECOM 2012).	Pending 2014 [e]	Soil	Arsenic	LUCs
Former Pearl City Junction				
The Navy's Fleet and Industrial Supply Center (FISC) acquired the PCJ property in 1944, and constructed four warehouse buildings at the site. In 1962, the Defense and Reutilization Marketing Office (DRMO) began using the site to store lime, fuel, hydraulic fluid, photographic chemicals, and paints, among other materials. All warehouse buildings have since been demolished. Two soil removal actions for dieldren- and PCB-containing soils have been conducted, and the Air Force has removed a fuel pipeline along the northern boundary of the site. However, subsurface soil containing PCBs and dieldrin remains onsite at concentrations that could pose unacceptable risk to humans if unlimited or unrestricted use of the site is allowed.	29 September 2010 [f]	Soil	Dieldrin, PCBs	LUCs

Description	Date of Decision Document	COCs Remaining on Site at Issuance of Decision Document		Selected Remedy
		Medium	Constituent(s)	
Building 6				
The Bldg. 6 Foundry Shop was constructed in 1915 to cast new or replacement parts for naval vessels. Foundry operations began during World War I and reached a peak during and shortly after World War II. More recently, foundry operations were limited to casting small replacement metal parts. Casting operations were conducted at multiple locations throughout Bldg. 6. Most of the foundry equipment is still in place; however, foundry operations ceased altogether in 1997.	24 July 2012 [g]	Soil	Metals, PAHs, and PCBs	LUCs (including concrete cover and long-term management)

ACM asbestos-containing material
DON Department of the Navy
DRMO Defense Reutilization Marketing Office
FISC Fleet and Industrial Supply Center
GSA geographical study area
PCB polychlorinated biphenyl
PCJ Pearl City Junction
TCRA time-critical removal action

[a] Department of the Navy (DON). 2011. *Record of Decision, Ford Island Landfill, Joint Base Pearl Harbor-Hickam, Ford Island, Oahu, Hawaii.* JBPHH, HI: Naval Facilities Engineering Command, Pacific. September.
[b] Department of the Navy (DON). 2009. *Final Record of Decision, Building 284 and Former Buildings 80 and 302, Pearl Harbor Naval Complex, Oahu, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. August.
[c] Department of the Navy (DON). 2010. *Record of Decision, Three Transformer Sites (TD-10, K-14, W-4/W-5), Pearl Harbor Naval Complex, Oahu, Hawaii*. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. August.
[d] Department of the Navy (DON). 2010. *Record of Decision, Shoreline Site Northwest of Dry Dock #3, Pearl Harbor Naval Facilities Engineering Command Shipyard and Intermediate Maintenance Facility, Pearl Harbor, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. March.
[e] At the time of publication of this report, the record of decision for the 4th Street Coral Pit had not been finalized. However, it is anticipated to be final prior to the finalization of this review.
[f] Department of the Navy (DON). 2010. *Record of Decision, Former Pearl City Junction, Pearl City, Oahu, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. September.
[g] Department of the Navy (DON). 2012. *Record of Decision for Building 6. Joint Base Pearl Harbor-Hickam, Pearl Harbor, HI*: Naval Facilities Engineering Command, Pacific. June.

REPORT FORMAT

The five-year reviews of the seven sites are presented in parallel format in this report to maintain site-specific continuity while following the outline defined in the *Comprehensive Five-Year Review Guidance* (EPA 2001). Each site's five-year review follows an identical outline.

A single introduction section is presented in the front of the document, following the Acronyms and Abbreviations list. It includes a general physiographic description, as well as region specific information. The main report presents the individual site reviews. Section and page numbering is independent for each site; page headers identify the site under review.

The report presents the five-year review for each site under its respective section cover. Each site is reviewed in accordance with the following headings recommended in the EPA (2001) guidance:

- Site Chronology
- Background
- Remedial Actions
- Progress Since the Last Five-Year Review
- Five-Year Review Process
- Technical Assessment
- Issues, Recommendations, and Follow-up Actions
- Protectiveness Statement

The Five-Year Review Site Inspection Checklist, Site Photographs, and Interview Forms are included as Attachments to each site's review. Page headers and title pages identify the site under review.

The Certification of Protectiveness for the seven sites is presented at the end of the report.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Pearl Harbor Naval Complex (Includes: Ford Island Landfill, Building 284 and Former Buildings 80 and 302, Various Transformer Sites, Shoreline Site Northwest of Dry Dock #3, 4th Street Coral Pit, Former Pearl City Junction, and Building 6)		
EPA ID: HI4170090076		
Region: 9	**State:** HI	**City/County:** Honolulu/Honolulu
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status: ☒ Under Construction ☐ Operating ☐ Complete		
Multiple OUs? ☒ YES ☐ NO		
Construction completion dates: Not applicable at this time		
Have sites been put into reuse? ☒ YES (not applicable to all sites) ☐ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency: Department of the Navy		
Author name: NAVFAC Hawaii		
Author title: --		**Author affiliation:** Navy CLEAN Contractor
Review period: May 2013 to August 2014		
Date(s) of site inspection: 23-24 July, 12 September, 9 October 2013; 9 January 2014		
Type of review: ☐Policy ☒ Statutory, NPL Remedial Action Site ☐ Discretionary		
Review number: ☒ 1 (first) ☐ 2 (second) ☐3 (third) ☐Other (specify)		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#____ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify): Signature date of earliest Record of Decision		
Triggering action date: Signature date of earliest Record of Decision: Bldg. 284 and Former Bldgs. 80 and 302 Record of Decision signed on 29 September 2009		
Due date ***(five years after triggering action date)*:** 29 September 2014		

Summary of Five-Year CERCLA Review of Seven PHNC NPL LUC Sites

Issues	Recommendations and Follow-up Actions	Anticipated Date of Implementation	Protectiveness Statement
Ford Island Landfill			
Although soil vapor sampling was incorporated into a revised long-term monitoring plan finalized in July 2013 (AECOM 2013), the results were not available for review.	Soil vapor sampling will be conducted during the next annual sampling event scheduled for August/September 2014. During the next five-year review, soil vapor results should be evaluated.	August 2014 (sampling); September 2019 (further evaluation)	The remedy at the Ford Island Landfill site, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. The containment system and its components should be maintained to prevent future exposure. Although no buildings are currently at the site, the vapor intrusion pathway should be evaluated to ensure future protectiveness. No changes in land use are expected in the foreseeable future.
Currently groundwater monitoring is scheduled to be conducted on an annual basis. However, groundwater monitoring results for 2013 were not available for review. Based on previous groundwater monitoring data, metals concentrations appear to be decreasing.	During the next five year review, the sampling frequency and locations should be evaluated to optimize the monitoring plan.	September 2019	
Unauthorized driving on the landfill may compromise the future integrity of the soil cap.	If unauthorized driving continues to occur and damage to the cap is observed, consider installing chains and bollards or a similar restriction to prevent vehicle access via the shallow portion of the swale.	Ongoing	
Vegetation growing in swale outlets may affect the discharge of surface runoff from the site.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Vegetation growing in rip-rap could affect shoreline protection.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Ongoing issues with the sprinkler system include the disabling of individual sprinkler heads by recreational visitors and fishermen. Exposed soil and dry grass was observed during the site inspection.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Monitoring well MW-6 was observed without a lock; other wells had vaults that were missing bolts.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Building 284 and Former Buildings 80 and 302			
The coral gravel cover described in the ROD and RAWP appears to have been replaced by asphalt.	The NAVFAC RPM indicated that the work done to replace the coral gravel was done with the proper notifications and no soil six inched below ground surface was disturbed. However, the LUC work plan and annual inspection forms need to be updated to indicate that the asphalt cover has replaced the coral gravel and will need to be verified and inspected.	September 2015	The remedy at Bldg. 284 and Former Buildings. 80/302, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. No changes in land use are expected in the foreseeable future.
The long-term monitoring plan was finalized in July 2013 (AECOM 2013), and the first sampling event was completed in February 2014; Therefore, the results were not available for review.	During the next five-year review, groundwater sampling results from Bldg. 284 should be evaluated.	September 2019	
Exposed soil and dry grass may eventually compromise the integrity of the soil caps.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Vegetation growing in rip-rap at the Bldg. 284 site may affect the protectiveness of the shoreline.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Minor cracks and holes in pavement at the Former Bldgs. 80/302 site.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Fishing and dumping were observed at the shoreline for Bldg. 284.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Various Transformer Sites			
No LUC signage is present at the TD-10 transformer site. In addition, for the LUC area at TD-10, a large PCB mark is required in accordance with 40 CFR §761.45.	Install PCB warning signs to prevent ground disturbance and warn of a chemical hazard.	September 2015	The remedies at the TD-10, K-14, and W-4/W-5 transformer sites, a PHNC NPL site on Oahu, Hawaii, are protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. No changes in land use are expected in the foreseeable future.
Shoreline Site Northwest of Dry Dock #3			
Orientation of LUC signage does not clearly indicate the LUC area boundaries.	Reposition or reword signs to more clearly indicate the bounds of the LUC area.	September 2015	The remedy at the Shoreline Site Northwest of Dry Dock #3, a PHNC NPL site on Oahu, Hawaii, is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. No changes in land use are expected in the foreseeable future.
Vegetation growing in shoreline area may compromise shoreline protection.	Monitor vegetation as necessary to ensure shoreline protection.	Ongoing	
Minor cracks and holes in concrete and pavement.	Pavement should be regularly monitored and repaired as necessary to ensure that larger cracks (which could create an exposure concern) do not develop.	Ongoing	
4th Street Coral Pit			
The ROD has not been finalized and the remedy has not been implemented, including LUCs and signage.	Once the ROD has been signed, the LUCs should be implemented. LUC signage should be installed to specifically warn of contaminated soil and prohibit unauthorized digging.	TBD	A protectiveness determination of the remedy at the 4th Street Coral Pit, a PHNC NPL site on Oahu, Hawaii, will be deferred until the ROD is signed and the remedy is implemented. It is expected that the ROD will be signed in late 2014 and a protectiveness determination will be made once the remedy is implemented.

Summary of Five-Year CERCLA Review of Seven PHNC NPL LUC Sites

Issues	Recommendations and Follow-up Actions	Anticipated Date of Implementation	Protectiveness Statement
Former Pearl City Junction			
The LUCs may not have been properly conveyed to the current landowners.	Inform the landowner of the LUCs and the need to adhere to Navy notification requirements prior to ground disturbance activities. The deed or environmental covenants should be revised as necessary to incorporate LUCs. Consider installing signs along the perimeter of the LUC areas and the front entrance gate to notify anyone onsite of the LUC areas and restrictions.	Pending discussion and agreement with the current landowners on land use restrictions/implementation	The remedy at the Former PCJ, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment in the short term because no evidence of exposure to contaminated soil has occurred. However, in order for the remedy to be protective in the long-term, follow-up actions need to be taken. A RAWP, as well as the deeds and covenants, need to be finalized and implemented in accordance with the LUCs to continue to prevent exposure to contaminated soils at the site. No changes in land use are expected in the foreseeable future.
A remedial action work plan has not been finalized.	A remedial action work plan may help ensure the remedy is being implemented as necessary.	Pending discussion and agreement with the current landowners on land use restrictions/implementation	
Annual LUC inspections were not conducted.	After completion of the RAWP, LUC inspections should be documented on an annual basis to ensure the continued effectiveness of land use restrictions at the site.	Pending discussion and agreement with the current landowners on land use restrictions/implementation	
Since Hickam Air Force Base and Pearl Harbor combined, both LUC sites, Former PCJ and ST18-A, are overseen by the Navy.	Combining efforts for LUC implementation is not recommended because Former PCJ is part of the PHNC NPL, and ST18A is non-NPL.	NA	
Building 6			
LUC warning signs were not installed as of the date of this report and groundwater monitoring wells still needed to be decommissioned.	LUC warning signs should be installed and groundwater monitoring wells no longer in use at the site should be decommissioned.	Completed March 2014	The remedy at the Bldg. 6 site, a PHNC NPL site in on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. No changes in land use are expected in the foreseeable future.

PAH polynuclear aromatic hydrocarbon
TPH total petroleum hydrocarbons

CONTENTS

INTRODUCTION FIGURE

ACRONYMS AND ABBREVIATIONS (INTRODUCTION SECTION ONLY)

§	Section
Bldg.	Building
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency, United States
LUC	land use control
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PHNC	Pearl Harbor Naval Complex
PHNSY & IMF	Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility
RAB	Restoration Advisory Board
U.S.	United States

I. Introduction

This report presents a five-year review of seven Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) land use control (LUC) sites on the island of Oahu. The seven sites are listed in Table I-1.

Table I-1: Seven PHNC NPL LUC Sites Undergoing Five-year Review

Navy Site Name	Navy Site Location	EPA OU	EPA OU Name
Ford Island Landfill	Ford Island	05	Ford Island Landfill
Bldg. 284 and Former Bldgs. 80 and 302	Ford Island	12	Ford Is. HazSites (Sans LF)
Various Transformer Sites (TD-10, K-14 and W-4/W-5)	TD-10 [Ford Island], K-14 [Halawa Main Gate], W-4/W-5 [Waipio Peninsula]	01	Sitewide
Shoreline Site Northwest of Dry Dock #3	Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility [PHNSY & IMF]	06	NSY Dry Dock #3
4th Street Coral Pit	West Loch Annex	24	West Loch 4th St. Coral Pit LF
Former Pearl City Junction	Pearl City	14	Pearl City Junction
Bldg. 6	PHNSY & IMF	17	NSY Bldg. 6, Former Foundry

OU operable unit

PHNC is identified on the NPL as United States (U.S.) Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System Number HI4170090076 and includes all seven sites. The NPL listing for PHNC was proposed on 29 July 1991 and finalized on 14 October 1992. The general location of the seven sites is shown on Figure I-1.

I.1 Purpose of the Review

This five-year review has been conducted to evaluate whether the LUCs at the seven PHNC NPL sites remain protective of human health and the environment. This review is required to address the contaminated media that remain above levels that allow for unrestricted land use and unlimited exposure at the seven sites. In addition, the report identifies any issues found during the review and recommendations to address them.

I.2 Authority for Conducting the Five-Year Review

The EPA and Navy policies require a five-year review of remedial actions in compliance with CERCLA. The Department of the Navy must implement five-year reviews consistent with CERCLA Section (§)121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300). CERCLA §121, as amended states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such Site in accordance with [104] or [106]; the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The NCP further interprets the requirement in 40 CFR 300.430(f)(4)(ii), which states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

I.3 WHO CONDUCTED THE FIVE-YEAR REVIEW

Naval Facilities Engineering Command (NAVFAC), Hawaii conducted this five-year review of the remedies implemented at the seven PHNC NPL sites at Joint Base Pearl Harbor-Hickam. The review was prepared at the request of NAVFAC Hawaii under contract task order number KB12 of contract number N62470-11-D-8013.

I.4 OTHER REVIEW CHARACTERISTICS

In accordance with Navy guidance, the first site on an installation that triggers the five-year review clock initiates the five-year review process for the entire installation (DON 2011). Therefore, the trigger date for this five-year review was 29 September 2009, when the first Record of Decision (for Bldg. 284 and Former Bldgs. 80/302) for the seven sites was signed by the Navy. This five-year review started in July 2013. It includes data collected from August 2009 through January 2014 when the site inspections were completed. In addition, the risk evaluation was conducted using May 2013 regional screening levels (EPA 2013), the most current screening criteria available as of September 2013. Depending on the site, earlier data pertinent to trend analysis or contained in reports examined for this review were also considered. Based on Navy policy (DON 2011), all future five-year review dates will be generated from the previous five-year review signature date. Therefore the due date for the next five-year review will be triggered by the Navy's signature on this five-year review.

I.5 COMMUNITY INVOLVEMENT

The Pearl Harbor-Hickam Restoration Advisory Board (RAB) holds an average of three to four meetings per year to update the public on the Environmental Restoration Program and status of Installation Restoration Program site projects. The RAB helps to promote community awareness of environmental restoration issues at JBPHH. Information is provided through quarterly meetings of the RAB, by maintaining the public information repository, and by publishing various announcements, fact sheets, and public notices in the local newspapers.

As part of the Navy's community involvement program, the commencement of the five-year review was announced at a 23 July 2013 Pearl Harbor-Hickam RAB meeting held for the Navy Environmental Restoration program at Leeward Community College and on 9 December 2013 and 24 June 2014 at the Oahu Veterans Center.

I.6 NEXT REVIEW

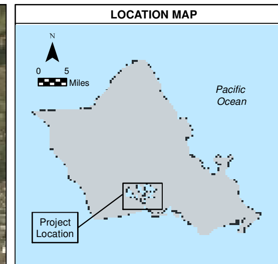
The next five-year review for the seven PHNC NPL LUC sites on Oahu, Hawaii, is anticipated to be required by September 2019.

I.7 REPORT STRUCTURE

This report is the result of a NAVFAC Hawaii installation-wide effort to synchronize the process for five-year reviews for all sites and all activities. Each site is reviewed separately by the sequential section headings used in the EPA (2001) *Comprehensive Five-Year Review Guidance* template. Section and page numbering is parallel for the seven reviews, presented in seven separate sections.

Site-specific documents (Inspection Checklist, Photographs, and Interview Forms) are included as attachments at the end of each site's review. The Certification of Protectiveness (the approval signature) is presented following the five-year review sections for the seven sites.

LOCATION MAP



LEGEND

Location of Five-Year Review Sites

NOTES

1. Map Projection: Hawaii State Plane Zone 3, NAD 83
2. Base Map Orthophoto: Earth Data, USGS Hawaii Data Clearinghouse.

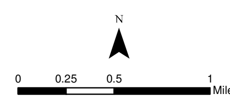


Figure I-1
Location of Seven NPL LUC Sites
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

I.8 REFERENCES (INTRODUCTION SECTION ONLY)

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First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

First Five-Year CERCLA Review of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

CONTENTS

Ford Island Landfill

ACRONYMS AND ABBREVIATIONS

µg/L	microgram per liter
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
COC	chemical of concern
DDT	dichlorodiphenyltrichloroethane
DOH	Department of Health, State of Hawaii
EE/CA	engineering evaluation/cost analysis
EPA	Environmental Protection Agency, United States
HI	hazard index
LUC	Land Use Control
JBPHH	Joint Base Pearl Harbor Hickam
LTM	long-term monitoring
msl	mean sea level
NAVFAC	Naval Facilities Engineering Command
NPL	National Priorities List
O&M	operation and maintenance
PHNC	Pearl Harbor Naval Complex
PRG	preliminary remediation goal
RAB	Restoration Advisory Board
RAO	remedial action objective
RI	remedial investigation
ROD	Record of Decision
RPM	remedial project manager
SI	site inspection
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
U.S.	United States

1. Site Chronology

The Ford Island Landfill Site is a land use control (LUC) site in the Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) sites at Joint Base Pearl Harbor Hickam (JBPHH), Oahu, Hawaii. Significant events relevant to this site are presented in Table 1-1.

Table 1-1: Ford Island Landfill Site Chronology of Events

Event	Date of Event
Military development on Ford Island begins, including the construction of Naval Air Station Ford Island and Army Air Station Luke Field, hangar and support facilities, housing structures, and an unpaved runway (DON 2011).	1912–1917
An area near the western shoreline was used as a disposal and burn area for wastes generated by maintenance activities performed on Ford Island. The site became known as the Ford Island Landfill (DON 2011).	Late 1930s–1960s
Ford Island Landfill was used for the disposal of bulk debris. When the Navy discontinued landfill dumping, they covered approximately 80 percent of the landfill with a final layer of soil. Historical evidence indicates that the landfill area extended into Pearl Harbor (DON 2011).	Late 1960s–1982
The Navy conducted a site inspection (SI) as an initial assessment of environmental conditions at the landfill. The SI identified nine metals, two semivolatile organic compounds, and a single polychlorinated biphenyl Aroclor as chemicals of concern (COCs) in soil, groundwater, and marine sediment (Ogden 1995). The SI recommended containment of landfill wastes (i.e., capping) (Ogden 1993).	1992
A Removal Site Evaluation identified low concentrations of three metals (copper, lead, and zinc) and a single semivolatile organic compound (SVOC) (phenanthrene) as potential COCs in groundwater samples. Geophysical and trenching activities indicated that the landfill contains metal fragments, concrete rubble, and miscellaneous debris. Ash, discovered below mean sea level near the current landfill shoreline, suggested that incinerated wastes were dumped into Pearl Harbor (Ogden 1997).	1994
An engineering evaluation/cost analysis was conducted which identified a landfill containment system that includes a permeable and vegetative soil cap as the most cost-effective containment method to attain long-term reduction of the risks posed by the landfill (Ogden 1995).	1995
Construction of the landfill containment system was completed as part of a non-time-critical removal action. The permeable vegetative cap over the landfill was completed to prevent contaminated surface soils from eroding and entering Pearl Harbor and to reduce infiltration of precipitation into the landfill (Ogden 1998).	1996
A five-year long-term monitoring program was initiated in April 1997 to monitor groundwater and surface water conditions at the landfill to ensure the containment system continues to function as designed and to evaluate whether potentially harmful levels of metals from the Ford Island Landfill are leaching into the groundwater and surface water of Pearl Harbor. Six baseline monitoring events, four semiannual monitoring events, and two annual monitoring events were subsequently performed (Monitoring Events 1 through 12). No analytes exceeded State of Hawaii Department of Health (DOH) Tier 1 action levels or calculated analyte specific Shewart-cumulative sum control limits. Discontinuing the groundwater monitoring program was recommended (Ogden 2002).	1997–2002
An operation and monitoring (O&M) plan was prepared for the containment system at the Ford Island Landfill. The O&M plan summarized requirements for the inspections of the landfill containment system and provided general irrigation and fertilization recommendations for the vegetative cover (Ogden 1998).	1998
Because of regulatory concerns about metals and potential impacts to Pearl Harbor, a draft long-term monitoring plan was prepared in August 2003 that proposed continuing the groundwater monitoring program as detection monitoring for another 5 years (Dawson 2003).	2003
Analytical results of the 13th monitoring event in September 2003 indicated that elevated metals concentrations are present in groundwater at the landfill (particularly at monitoring wells MW-11, MW-12, and MW-13) (Dawson 2003).	2003
The groundwater monitoring plan and program were revised prior to the 14th monitoring event, conducted in April 2005, to include an interwell data comparison approach. Analytical results for the 14th monitoring event indicated dissolved copper and nickel were detected at concentrations exceeding their screening criteria (Earth Tech 2006). Seven additional surface water sampling locations were added for the 15th monitoring event. Dissolved copper and dissolved zinc were detected above the screening criteria (Earth Tech 2006).	2005

Event	Date of Event
Data during the 16th monitoring event (August 2006) indicated that copper is the primary contaminant exceeding its screening criterion, which is consistent with previous monitoring events.	2006
A tidal study was conducted and concluded that tidal oscillations have little to no effect on varying copper concentrations (Earth Tech 2008).	2008
The 24th through 27th Monitoring Events occurred between February 2009 and January 2010 (AECOM 2009, 2010). Exceedances of groundwater screening criteria were noted for dissolved copper, dissolved nickel, dissolved phosphorus, and total nitrate-nitrite as nitrogen. The landfill site inspection during most of the events observed the landfill irrigation system to be inoperable and topsoil exposed due to lack of vegetated growth.	2009–2010
A focused feasibility study was conducted for the Ford Island Landfill Site (AECOM 2010a) and recommended LUCs and long-term monitoring and maintenance (LTMM) as the final remedy. A proposed plan (DON 2010) was then prepared to present the various alternatives considered, identify LUCs and LTMM as the recommended alternative, explain the rationale for selecting the alternative, and request public comment.	2010
Total nitrate was the only exceedance of screening criteria noted for the 28th Monitoring Event in April 2010. No exceedances of dissolved metals were noted. Consistent with previous observations, the landfill irrigation system was inoperable and areas of exposed topsoil were observed (AECOM 2010b).	2010
Interwell and intrawell comparisons were conducted for the 29th Monitoring Event conducted in October 2010 and suggested groundwater analyte concentrations were remaining stable. The landfill inspection observed exposed topsoil and mangrove saplings growing within the rip-rap lining the landfill shoreline (AECOM 2011).	2010
A record of decision was completed with LUCs and LTMM as the final remedy (DON 2011).	2011
Three monitoring events were completed since the record of decision was signed in 2011. During each of the three events, interwell comparisons of groundwater indicated several metals exceeded their respective prediction limits. Intra-location comparisons of surface water data indicated that concentrations of dissolved metals are relatively stable at most surface water sampling locations (AECOM 2011, 2012a, 2012b; E2 2013).	2011–2012
A revised long-term monitoring plan was completed to update the information from the 2006 plan and describe the site inspection, groundwater monitoring, surface water monitoring, and also included soil vapor sampling activities to be implemented (AECOM 2013).	2013

2. Background

2.1 SITE DESCRIPTION

Ford Island encompasses approximately 450 acres and is located at JBPHH, on the southern coast of Oahu, Hawaii (Figure 1). The Ford Island Landfill is part of the PHNC NPL site under the United States (U.S.) Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act Information System Number HI4170090076. Executive Order 12580 (EO 1987) authorizes the Navy, as the lead agency, to conduct environmental response actions at Navy sites such as the Ford Island Landfill.

Ford Island is presently used for administration, storage, operation, training, and maintenance activities for various military tenants. The island provides housing and recreational facilities for Navy personnel, and is undergoing redevelopment for base housing, recreational sites, and additional commercial and industrial facilities. The Ford Island Landfill site encompasses approximately 4.4 acres on the southwest side of Ford Island along the Pearl Harbor shoreline. The landfill was in use from the late 1930s through 1982, and reportedly received industrial and household wastes generated on the island. The landfill surface across most of the site is relatively flat and slopes steeply toward Pearl Harbor along the shoreline. Grass was planted on the surface to stabilize the cap layer and prevent erosion.

The landfill containment system, which was installed in December 1996, consists of a permeable vegetative soil cap, a drainage trench, a groundwater monitoring network that includes 12 monitoring wells, and shoreline protection along Pearl Harbor.

2.2 PHYSICAL CHARACTERISTICS

2.2.1 Topography

With the exception of the northeast corner of the island, the land surface of Ford Island is generally less than 20 feet above mean sea level (msl). In the northeast corner of the island, the land surface elevation rises to over 27 feet above msl. The highest elevations occur along a line running from the northeast to southwest corners of the island.

The largest portion of the island is relatively flat or slopes gently from topographically high areas on the northeast to southwest portions of the island toward Pearl Harbor. The slope increases in the northeast portion and along the edges of the island.

2.2.2 Geology and Soils

Ford Island is classified as a coral outcrop by the U.S. Department of Agriculture, Soil Conservation Service (USDA SCS 1972), and consists primarily of coral and cemented calcareous sands. Honolulu series Salt Lake volcanics were later deposited on this coralline base; these volcanic rocks most commonly appear on the surface of Ford Island as a weathered volcanic tuff.

In general, soils on the Coastal Plain surrounding Pearl Harbor, including Ford Island, are derived primarily from the caprock formation. The caprock consists of interbedded terrestrial and marine deposits including alluvium eroded from the Koolau Volcanics and coralline limestone sediments. Low-permeability clay and silty clay units in the caprock form confining layers over a deep artesian aquifer in the underlying fractured Koolau basalts (Earth Tech 2006).

Because of past development and land reclamation efforts, significant portions of Ford Island are composed of fill material, consisting of mixtures of gravels, sands, silts, and clays. The fill material consists primarily of on-island derived materials, and the nature of fill deposits varies according to its source, placement method, and its compaction. Fill appears to be generally thickest near the shoreline and thinnest towards the center of the island and where volcanic tuff deposits are observable at the surface (Munro 1981). Changes in the composition and consistency of the fill material delineate the boundary between fill and in situ material. A significant portion of Ford Island is also covered by concrete and asphalt, which generally overlie fill material.

Site-specific geology at the Ford Island Landfill Site consists primarily of fill material overlying limestone, with fill thickness ranging from 1 to 15 feet (Ogden 1993). The contact between the fill and limestone is undulatory, and shows a gradual sloping toward the shoreline. Volcanic tuff was encountered at the base of MW-6 in the southeast corner of the site. The fill material present in the landfill occurs in heterogeneous layers, and consists as loosely-consolidated material mixed with gravelly sand, sandy silt, and clayey sand beneath a thin surface veneer of moderately-dry sandy to clayey silt mixed with gravel. The limestone encountered at the landfill is a moderately- to well-cemented coralline limestone with embedded bivalves.

2.2.3 Groundwater Hydrology

Ford Island is located in the Honolulu–Pearl Harbor basal groundwater aquifer area. The shallow groundwater beneath Ford Island is considered nonpotable and not hydraulically connected to the basal aquifer of Oahu. A direct correlation exists between changes in groundwater elevation underlying Ford Island and tidal fluctuations. During a previous investigation, tidal efficiencies were estimated for 10 wells. Tidal efficiencies for 9 of the wells ranged from 69 to 89 percent. The tidal efficiency in the remaining well was estimated at 34 percent (Ogden 1997). The source of shallow Ford Island groundwater is believed to originate from infiltration of precipitation and landscaping irrigation, combined with intrusion of seawater. As a result, the shallow groundwater is generally brackish.

Depth to groundwater at Ford Island ranges from approximately 3 feet below ground surface (bgs) in wells located along the shoreline to 19 feet bgs in wells located inland. The surficial cap rock aquifer occurs from the water table to the first underlying aquitard. The bottom of the aquifer was not encountered during the remedial investigation (RI); however, the aquifer is estimated to be approximately 16 feet thick (Ogden 1995). The aquifer is generally encountered within the weathered volcanic material, coralline debris, and lagoonal deposits.

Groundwater at Ford Island (including the site) is not currently used for drinking water purposes nor is it considered a potential source of drinking water. The shallow caprock groundwater at Ford Island is classified by the State of Hawaii Department of Health (DOH) as “ecologically important” since it discharges to Pearl Harbor (Mink and Lau 1990). Groundwater classification at Ford Island is discussed in detail in the RI report (Earth Tech 2003).

2.3 LAND USE

The Ford Island Landfill Site is a vegetated, undeveloped parcel located along the western edge of Ford Island, along the Pearl Harbor shoreline. It is bordered to the north by the former Camel Refurbishing Area (which has been redeveloped into residential housing and a community recreation area) and the Building 284 Site (located to the southeast on the other side of a seaplane ramp). The anticipated future land use for this site will remain commercial/industrial.

2.4 HISTORY OF CONTAMINATION

The Ford Island Landfill was used from the mid-1930s until the late 1960s for disposal activities that involved the dumping and burning of wastes generated by maintenance activities performed on Ford Island. After the aforementioned disposal activities were discontinued, bulk debris were disposed of and covered with soil until these activities were also discontinued in 1982. When the Navy discontinued landfill dumping, they covered approximately 80 percent of the landfill with a final layer of soil. No records of disposal practices or waste quantities are available for any of the periods of waste disposal activity. Historical evidence indicates that the landfill area extends into Pearl Harbor.

Several investigations of the Ford Island Landfill have been conducted since the 1990s. The Navy conducted a site inspection (SI) in late 1991 and early 1992 as an initial assessment of environmental conditions at the landfill, which included installation of four monitoring wells and collection of soil, groundwater, marine sediment, and soil gas samples. The SI identified nine metals, two semivolatile organic compounds (SVOCs), and a single polychlorinated biphenyl Aroclor (Aroclor-1260) as chemicals of concern (COCs) in the soil, groundwater, and marine sediment. The SI recommended containment of landfill wastes (i.e., capping) (Ogden 1993).

In 1994, a second investigation, the removal site evaluation, was conducted to obtain additional information on the conditions at the landfill. As part of this investigation, six additional monitoring wells were installed; exploratory trenches were dug to observe the locations of different types of landfill wastes; groundwater samples were collected to establish a water quality baseline; and a tidal study was performed. This second investigation identified low concentrations of three metals and a single SVOC in groundwater samples, and found that groundwater beneath the landfill is influenced by tidal variations in Pearl Harbor. Geophysical and trenching activities indicated that the landfill contains metal fragments, concrete rubble, and miscellaneous debris. Ash discovered below the water table near the current landfill shoreline suggests that incinerated wastes were dumped into Pearl Harbor (Ogden 1997).

2.5 INITIAL RESPONSE

In 1995, an engineering evaluation/cost analysis (EE/CA) was conducted that utilized the EPA presumptive remedy approach to identify and select a landfill containment system (Ogden 1995). The EE/CA provided a comparative analysis of five different containment system alternatives, and identified the permeable soil cap alternative as the most cost-effective containment method which would attain long-term reduction of the risks posed by the landfill (Ogden 1995).

In December 1996, construction of a landfill containment system was completed as part of a non-time-critical removal action. The permeable and vegetative cap over the landfill was completed to prevent contaminated surface soils from eroding and entering Pearl Harbor, and to reduce infiltration of precipitation into the landfill, reducing the possibility for contaminants to leach to groundwater and enter Pearl Harbor. The landfill cap consisted of three layers (from bottom to top): an engineered fill layer, a vegetation/erosion layer, and a topsoil layer.

The engineered fill layer has a varying thickness and is composed of compacted earthen fill. The principal function of this layer is to cover exposed waste, fill low-lying areas of the landfill, and provide a foundation layer for the cap. As such, the engineered fill layer delivers a smooth transition between landfill wastes and the cap. The vegetation/erosion layer comprises earthen fill with a minimum thickness of 12 inches. The principal function of this layer is to serve as the primary barrier to direct contact with landfill wastes. It holds surface water infiltration to allow for increased evapotranspiration and provides secondary support of vegetative growth. Another function of this layer is to act as a buffer layer that can exhibit erosion problem areas needing repair without exposing the waste. The fill soil was compacted to a minimum relative density of 90 percent; the topsoil layer is a minimum of 6 to 12 inches thick and was designed to support vegetation. The topsoil was placed directly on the fill and not compacted. Surface vegetation, consisting of common Bermuda grass (*Cynodon dactylon*), is intended to stabilize the cap surface and prevent erosion (Ogden 1998).

The cap surface was vegetated with common Bermuda grass (*Cynodon dactylon*), which is intended to protect the cap and deter erosion (Ogden 1998). Rip-rap was installed along the shoreline to prevent erosion. An irrigation system was installed to maintain the vegetation on top of the cap, and a concrete drainage trench was constructed to direct surface runoff away from the landfill. Monitoring well MW-07 was abandoned in place and replaced with well MW-07A to allow for the construction of the concrete drainage trench. After construction of the landfill containment system along the shoreline of the landfill, three additional monitoring wells were installed in April 1997. At that time, the groundwater monitoring well network at the landfill consisted of 13 monitoring wells distributed across the site.

2.6 BASIS FOR TAKING REMEDIAL ACTION

Information regarding potential sources of contamination, impacted media, and potential receptors is presented in the Ford Island Landfill record of decision (ROD) (DON 2011).

COCs identified in surface soil at the Ford Island Landfill Site included total petroleum hydrocarbons (TPH) as diesel range organics, arsenic, and beryllium. Higher concentrations of chemicals were found in subsurface soils; however, only metals (arsenic, copper, and mercury), Aroclor 1260, and TPH were identified as COCs. Antimony and copper were identified as COCs in groundwater based on a comparison of site data to State of Hawaii Surface Water Standards. Antimony and mercury were identified as COCs in sediment based on a comparison of site data to National Oceanic and Atmospheric Administration and State of Washington Marine Sediment Quality Standards. In addition, COCs identified for the fish ingestion pathway included arsenic, copper, mercury, silver, and TPH. Estimated groundwater concentrations of several contaminants detected in soil were made using Summer's Model and used in the evaluation of the fish ingestion pathway.

A streamlined risk evaluation was presented in the EE/CA (Ogden 1995). The exposure pathways evaluated in the EE/CA are representative of site conditions prior to the 1996 emplacement of the landfill containment system. As a result, current health risks are much lower than the potential health risks identified in the EE/CA due to the subsequent construction of the landfill containment system.

Potentially exposed populations evaluated under the land use conditions at that time included adult and child onsite visitors and recreational fishermen. As the development plan for Ford Island has incorporated the landfill as a recreational area, it was anticipated that exposed populations under the future land use are equivalent to those under current land use. The risk characterization results suggested that contaminants in surface soil, subsurface soil, and groundwater would not pose any unacceptable risks to human receptors because of leaching and groundwater discharge to Pearl Harbor.

Potential exposure to contaminants by ecological receptors in the transition zone between groundwater and surface water and in nearby surface water is low and declining over time based on historical groundwater and surface water data and trends. Potential ecological risk from concentrations resulting from groundwater discharge that would result in adverse impacts was low and declining at the time the ROD was published in 2011.

The following recommendations were presented for consideration at the landfill:

- The area should continue to be used for open recreational space.
- A landfill containment system that includes a cap be installed.

A permeable vegetated soil cap was subsequently constructed on the site in December 1996, effectively cutting off exposure to impacted soils and waste within the landfill. Thus, the direct exposure pathway is considered incomplete. Similarly, the air pathway (exposure to fugitive dust) is also considered incomplete due to the presence of the soil cap. Direct exposure to underlying groundwater is not expected since shallow groundwater at Ford Island is brackish, and potable water is supplied from offsite basal aquifer sources in Waiawa and Red Hill (Ogden 1995). Recreational ingestion of fish and shellfish caught in contaminated surface water and/or sediment potentially impacted by landfill groundwater discharge is possible, though unlikely, as fishing and shell fish collecting is restricted throughout much of Pearl Harbor through a DOH fishing advisory issued in 1998. Direct exposure to surface water via recreational activities such as swimming or surfing is considered insignificant due to the trace contaminant levels and low frequency of this type of activity in this military/industrial area of Pearl Harbor (Ogden 1995).

Potential exposure of terrestrial ecological receptors to soil contamination could occur if contaminated soil underlying the existing cap were exposed. In addition, ecological receptors in Pearl Harbor could be exposed if contaminated soil were transported to Pearl Harbor. Although the underlying shallow aquifer is not a drinking water aquifer, it has been designated as "ecologically important" due to the close proximity to Pearl Harbor and potential for contamination to migrate within the shallow aquifer and discharge to Pearl Harbor. Current ecological receptors are protected from direct exposure to contaminated soil by the soil cap, and groundwater monitoring is being conducted to ensure that elevated levels of metals do not leach to the underlying shallow aquifer and potentially discharge to and adversely impact Pearl Harbor.

To ensure the protection of future human and ecological receptors, a remedy was required to safeguard that the integrity of the permeable soil cap is maintained and that potential exposure to underlying impacted media does not occur.

The results of previous site investigations, decision documents, and risk assessment calculations led to the identification of the COCs and the selection of preliminary remediation goals for the Ford Island Landfill Site. COCs and screening criteria as documented in the focused feasibility study (AECOM 2010) are presented in Table 2-1 below. An updated evaluation of the COCs, chemicals of potential concern, and screening criteria for the Ford Island Landfill Site is presented in Section 6.

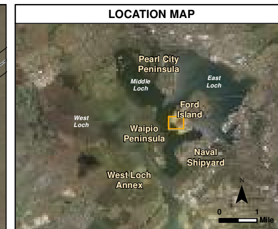
Table 2-1 : COCs and PRGs for Ford Island Landfill Site

COC	Maximum Detected Concentration	Residential PRG [a, b]	Industrial PRG [a]	Upper Background Value [c]
Surface and Subsurface Soil (mg/kg)				
Antimony	466	31	410	7.3
Arsenic	241	0.39	1.6	16
Cadmium	78.6	70	800	2.3
Copper	22,800	3,100	41,000	110
Lead	4,400	400	800	29–96 [d]

COC	Maximum Detected Concentration	Residential PRG [a, b]	Industrial PRG [a]	Upper Background Value [c]
Zinc	40,600	23,000	310,000	166
Aroclor 1260	16	0.22	0.74	N/A
Benzo(b)fluoranthene	0.56	0.15	2.1	N/A
Benzo(a)anthracene	0.56	0.15	2.1	N/A
Benzo(a)pyrene	0.32	0.015	0.21	N/A
Dibenz(a,h)anthracene	0.21	0.015	0.21	N/A
Groundwater (µg/L)				
Arsenic	43	36	N/A	N/A
Copper	196	2.9	N/A	N/A
Lead	6.8	5.6	N/A	N/A
Mercury	0.21	0.025	N/A	N/A
Nickel	26.3	8.3	N/A	N/A
Zinc	130	86	N/A	N/A
Surface Water (µg/L)				
Copper	100	2.9	N/A	N/A
Lead	6.8	5.6	N/A	N/A
Mercury	0.14	0.025	N/A	N/A
Nickel	22	8.3	N/A	N/A

Sources: Focused Feasibility Study (DON 2010).
µg/L microgram per liter
mg/kg milligram per kilogram
N/A not applicable
PRG preliminary remediation goal
[a] Soil PRGs based on 2009 EPA Regional Screening Level.
[b] Water PRGs based on State of Hawaii Surface Water Standards (DOH 2012).
[c] 95th percentile of Oahu caprock soil background concentration range (Earth Tech 2006).
[d] Lead from natural and anthropogenic background sources.

LOCATION MAP



LEGEND

- Current Groundwater Monitoring Well Sampling Location
- Current Surface Water Sampling Location
- Historical Groundwater Monitoring Well Sampling Location
- Historical Surface Water Sampling Location
- MW-08 (Abandoned)
- Ford Island Landfill LUC Boundary
- Residential Building

Notes

1. Acronyms and abbreviations
   LUC Land Use Control
2. Map Projection: Hawaii State Plane Zone 3, NAD 83
3. Base Map Orthophoto: Earth Data, USGS Hawaii Data Clearinghouse.

N

0 100 200 400 Feet

Figure 1
Ford Island Landfill Site Location Map
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

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3. Remedial Actions

A ROD was signed in 2011 that specified LUCs, including long-term monitoring and landfill containment system maintenance, for the Ford Island Landfill site at JBPHH (DON 2011).

3.1 Remedial Action Objectives

The objectives of the response action were as follows:

- To protect human and ecological health − the selected response action alternative would prevent direct contact and ingestion of contaminated soil.
- To protect ecological health − the selected response action would ensure COCs originating from the landfill do not impact the underlying groundwater or adjacent surface water at concentrations that would adversely impact ecological receptors.

Potential contamination in shoreline sediments adjacent to the site were not addressed as part of the response action and were not included in the ROD since the sediments are under investigation as part of a separate ongoing study being conducted by the Navy.

3.2 Remedy Description

Based on the screening of remedial action alternatives and the evaluation and comparative analysis of retained alternatives, the recommended alternative for the Ford Island Landfill was LUCs including long-term monitoring and landfill containment system maintenance. LUCs would be applied to the current 4.4-acre landfill boundary and would restrict the site to recreational use only.

Maintenance of the landfill containment system prevents direct contact of the underlying contaminated soil and debris and the migration or relocation of contaminated soil to areas where human or ecological exposure could occur. Landfill containment also reduces the potential for leaching of contaminants to groundwater. Groundwater monitoring ensures that if COCs do migrate to groundwater at concentrations that will adversely affect Pearl Harbor, they are identified promptly so the need for further action can be evaluated as part of long-term monitoring.

Figure 1 shows the LUC boundaries for the Ford Island Landfill site.

3.3 Remedy Implementation

Construction of the landfill containment system was completed as part of a non-time-critical removal action. In December 1996, construction of a permeable cap over the landfill was completed to (1) prevent contaminated surface soil from eroding and entering Pearl Harbor, and (2) reduce infiltration of precipitation into the landfill, thereby reducing the possibility of contaminants leaching to groundwater and entering Pearl Harbor. The landfill containment system includes a vegetative cover with an irrigation system to maintain the integrity of the vegetated cap and a concrete drainage trench to direct surface runoff away from the landfill. Monitoring well MW-07 was abandoned in place and replaced with well MW-07A to allow for the construction of the concrete drainage trench. Three additional, shallow monitoring wells (i.e., screen intervals of 3 to 18 feet bgs) (MW-11, MW-12, and MW-13) were installed in April 1997 after construction of the landfill containment system along the shoreline of the landfill. Upon completion of the landfill cap, a monitoring program was initiated to monitor chemicals in groundwater and surface water and inspect the landfill containment system (Ogden 1997, 1998).

3.4 Systems Operations and Maintenance

The Ford Island Landfill site does not have an active remedial system.

Compliance groundwater monitoring and site inspections continue on an annual basis (AECOM 2013). According to the remedial project manager (RPM), no significant cost variances indicative of potential problems were identified with regards to the operation and maintenance (O&M) costs, except for additional costs incurred because of issues with maintaining the sprinkler system (see Section 5.5).

4. Progress since the Last Five-Year Review

This is the first five-year review for the Ford Island Landfill site; consequently, there is no progress to report.

5. Five-Year Review Process

5.1 Administrative Components

The public was notified of the initiation of this five-year review in July 2013. The five-year review team members are listed in Table 5-1.

Table 5-1: Five-Year Review Team Members

DOH	Regulatory Project Manager: Maria Reyes/Wendy Ray
DON	RPM for five-year review: Jan Kotoshirodo
	RPM for specific site: Jan Kotoshirodo
EPA	Regulatory Project Manager: Christopher Lichens
AECOM	Project Manager: Dean Baxley
	Deputy Project Manager: Teresa Quiniola
	Project Support: Dustin Goto, Andrea VonBurg Hall

AECOM AECOM Technical Services, Inc.

The team members established a review schedule of May to December 2013, during which they performed community involvement related to the current five-year review, reviewed relevant documents and data, inspected the site, and interviewed the site project manager and regulators.

5.2 Document Review

This five-year review included a review of relevant documents including, O&M records, the ROD, remedial investigations, feasibility studies, risk assessments, WPs, remedial designs, completion reports, long-term monitoring and operation reports (including landfill inspection reports), monitoring data, and various compliance reports. The list of documents reviewed is provided in Section 9. Applicable groundwater and other cleanup standards, as listed in the ROD, were reviewed. Applicable or relevant and appropriate requirements and to be considered criteria that may have changed since the ROD was completed were also evaluated; however, no changes were noted.

A Revised Long-Term Monitoring (LTM) Plan was prepared to update the overall program objectives, approach, and sampling requirements for groundwater monitoring, surface water monitoring, and soil vapor sampling at Ford Island Landfill. The changes from the previous plan (Earth Tech 2006) include incorporation of a new background well for groundwater sampling, a reduction of surface water sampling locations (from 9 to 3), change from semi-annual to annual sampling, and the addition of a one-time soil vapor sampling event (AECOM 2013).

5.3 Data Review

Compliance monitoring at the Ford Island Landfill Site includes semi-annual landfill and soil cover inspections and groundwater and surface water monitoring. The LTM program was implemented to monitor landfill conditions and to ensure that the landfill containment system remains protective of human health and the environment.

5.3.1 Monitoring Reports

Landfill/soil cover inspections and groundwater and surface water monitoring began at the Ford Island Landfill Site in 1997. As of the publication of this First Five-Year Review, 33 monitoring reports have been completed. Four monitoring reports (e.g., 30th, 31st, 32nd, and 33rd) were published subsequent to the 2011 ROD and are reviewed below.

The landfill inspection comprises a visual survey of the monitoring well surface completions, the landfill vegetative cover, the irrigation system, the perimeter drainage trench, and the rip-rap shoreline protection. Deficiencies requiring correction are recorded on inspection forms for subsequent action.

The current groundwater monitoring well network consists of 12 monitoring wells distributed across the landfill and one background well located toward the center of the island. All wells installed at the landfill are shallow wells screened across the water table. Nine surface water samples are also collected as part of each monitoring event. Figure 1 shows the current groundwater monitoring well and surface water collection network. Analytical data collected during each monitoring event is compared to statistically-derived background and screening levels. Accordingly, assessment monitoring will be performed until no increasing trends are observed in the dissolved metals concentrations in landfill wells and the dissolved metals concentrations in groundwater samples from the landfill wells are below background concentrations or DOH surface water quality criteria, whichever is greater, for at least 3 consecutive years.

30th Monitoring Event (AECOM 2011). Groundwater and surface water sampling was conducted from 18–21 April 2011. Analytical results for groundwater indicated that only one metal, nickel, was detected in well MW-02 at a concentration of 10.4 micrograms per liter (µg/L), which exceeded the Hawaii Administrative Rules surface water standard of 8.3 µg/L. Interwell comparisons indicated that dissolved arsenic (one well), nickel (two wells), and zinc (two wells) exceeded their prediction limits, which may be attributed to interaction between landfill debris, groundwater, and surface water along the Pearl Harbor shoreline or may reflect differences in groundwater chemistry between the background location and the landfill. However, intrawell comparisons for groundwater indicated that no analytes exceeded their prediction limits, which indicates that dissolved metals concentrations were relatively stable in the landfill wells.

Intra-surface water sample location comparisons indicated that dissolved metals concentrations were relatively stable at all surface water sampling locations. No significant differences between the surface water chemistry at the surface water sampling locations were observed. An evaluation of current and historical surface water data indicated that nearshore surface water sampling locations SW-01, SW-05, and SW-07 were sufficient for evaluating surface water quality adjacent to the landfill.

The landfill inspection was conducted on 21 April 2011. The inspection indicated that significant vegetative growth had occurred in previously barren areas and only a few small bare areas remained. Inspection of the irrigation system indicated that the water source to the irrigation system had been turned off and the system was inoperable. Two sprinkler heads near well MW-12 were damaged. The drainage ditch structure was in good condition, but contained an accumulation of shells, sediment, gravel, and debris that blocks the discharge points. The shoreline protection was in good condition, but small trees (<2 feet tall) were growing within the rip-rap. Overall, the monitoring wells were in good condition, but the covers at some wells are difficult to remove due to damaged threading and rust on some of the bolts.

31st Monitoring Event (AECOM 2012a). Groundwater and surface water sampling was conducted from 10–14 October 2011. Dissolved copper was the only metal detected in groundwater samples from two wells (MW-13 and MW-14) at concentrations above its screening criterion. Dissolved copper was detected in well MW-13 at a concentration of 4.3 µg/L (duplicate sample result was 4 µg/L), which exceeded the surface water standard of 2.9 µg/L and is generally consistent with historical results. Dissolved copper was detected in the groundwater sample from background well

MW-14 at 4.6 µg/L, which is higher than previous results and inconsistent with historical results. Interwell comparisons indicated that dissolved arsenic (one well), copper (one well), nickel (two wells), and zinc (four wells) exceeded their prediction limits, which may be attributed to interaction between landfill debris, groundwater, and surface water along the Pearl Harbor shoreline or may reflect differences in groundwater chemistry between the background location and the landfill. Intrawell comparisons for groundwater indicated that two analytes exceeded their prediction limits, dissolved copper in MW-14 and dissolved zinc in wells MW-05 and MW-14. In general, the dissolved metals concentrations appeared to be relatively stable in the landfill wells.

Dissolved copper was detected at seven surface water sampling locations (SW-01 through SW-04 and SW-07 through SW-09) at concentrations ranging from 3.7 µg/L to 8 µg/L, which exceeded the surface water standard. Intra-surface water sample location comparisons indicated that dissolved metals concentrations were relatively stable at most surface water sampling locations, with only dissolved nickel exceeding its normal prediction limit at three locations. No significant differences in the general water chemistry at the surface water sampling locations were observed.

Landfill inspections were conducted on 13 October 2011 and 9 January 2012. All water lines were determined to be operable, but four sprinkler heads were not operating. One sprinkler head near well MW-11 was damaged and three sprinkler heads near MW-04 were inoperable because the water line leading to them had been capped during utility work in the area. Small trees were growing within the rip-rap shoreline protection and several dedicated groundwater monitoring pumps and well covers were in need of maintenance or repair.

32nd Monitoring Report (AECOM 2012b). Groundwater and surface water sampling was conducted from 3–5 April 2012. Dissolved copper was the only metal detected in groundwater samples from two wells (MW-12 and MW-13) at concentrations above its screening criterion. Dissolved copper was detected in the groundwater sample from well MW-12 at 30 µg/L, which is within the range of historical results, but exceeded the surface water standard of 2.9 µg/L. Dissolved copper was detected in well MW-13 at a concentration of 3.1 µg/L, which also exceeded the surface water standard, but is also generally consistent with historical results. Interwell comparisons indicated that dissolved arsenic (one well), dissolved copper (one well), nickel (two wells), and zinc (two wells) exceeded their prediction limits, which may be attributed to interaction between landfill debris, groundwater, and surface water along the Pearl Harbor shoreline or may reflect differences in groundwater chemistry between the background location and the landfill. In general, the dissolved metals concentrations appear to be relatively stable in the landfill wells.

Dissolved copper was detected at three surface water sampling locations (SW-01, SW-05, and SW-07) at concentrations ranging from 1.2 µg/L to 3.1 µg/L, which exceeded the surface water standard at only SW-01. No significant increasing trends in dissolved metals were observed. Intra-surface water sample location comparisons indicated that dissolved metals concentrations were relatively stable at the surface water sampling locations, with no metals exceeding their normal prediction limits.

The landfill inspection was conducted on 3 April 2012. Significant vegetative growth continued in previously barren areas and only a few small barren areas remain. One sprinkler head near well MW-11 was damaged, in addition to the four previously reported. Three sprinkler heads near MW-04 remained inoperable. Some minor blockage was observed in the concrete drainage trench due to vegetation at both outlets, particularly the north outlet. A minor amount of vegetation was also observed near MW-05, which was growing in some sediment that had accumulated within the trench. Little change was noted in the condition of the wells or the tree growth in the rip rap.

33rd Monitoring Event (Element 2013). Groundwater and surface water sampling was conducted from 29–30 October 2012. Dissolved copper exceeded its screening criterion in groundwater samples collected from MW-12 and MW-13, which are located adjacent to Pearl Harbor. Dissolved copper was detected in the groundwater sample from MW-12 at a concentration of 6.4 µg/L, and in the groundwater sample from MW-13 at a concentration of 6.9 µg/L; both of which exceed the screening criterion of 2.9 µg/L, but were within the range of historical sampling results for each respective location.

Dissolved nickel and zinc exceeded their screening criteria in the groundwater sample collected from MW-13. Dissolved nickel was detected at a concentration of 11.2 µg/L, which exceeded the screening criterion of 8.3 µg/L, but was still within the range of historical results. Dissolved zinc was detected at a concentration of 94.2 µg/L, which exceeded the screening criterion of 86 µg/L, but was also consistent and within range of historical results.

Two significant decreasing trends for dissolved metals were observed in groundwater. Monitoring well MW-04 had a significant decreasing trend for dissolved copper and well MW-13 had a significant decreasing trend for dissolved zinc. These groundwater trends are generally consistent with the 30th, 31st and 32nd monitoring events and indicate that dissolved concentrations of metals of concern are stable or decreasing. General water chemistry parameters were observed to be stable as the decreasing trends for chloride and total dissolved solids observed during the previous (32nd) monitoring event were not seen in this event.

Interwell comparisons indicated that dissolved arsenic (one well), dissolved nickel (two wells), and dissolved zinc (two wells) exceeded their prediction limits. Additionally, the general water chemistry parameters chloride, specific conductance, and total dissolved solids exceeded their prediction limits in all landfill wells, which is consistent with the previous three monitoring events. This may be attributed to interaction between landfill debris, groundwater, and surface water along the Pearl Harbor shoreline, or may reflect differences in groundwater chemistry between the background location and the landfill. No dissolved metals or general water chemistry parameters exceeded their prediction limits for intrawell comparisons in groundwater. In general, the dissolved metals concentrations and general water chemistry parameters appeared to be stable within each landfill well.

Dissolved copper exceeded its screening criterion of 2.9 µg/L in the surface water samples collected from SW-01 and SW-07, with detected concentrations of 3.2 and 3.5 µg/L respectively. Although historical concentrations of dissolved copper in surface water samples have generally been below the screening criterion, previous sampling results indicate that dissolved copper has exceeded its surface water standard at least once at higher concentrations at all surface water sampling locations.

Intra-surface water sample location comparisons indicated that dissolved metals concentrations and general water chemistry parameters are relatively stable at all surface water sampling locations, with the exception of specific conductance which showed a significant increasing trend at SW-01. This increase in specific conductance could potentially be attributed to decreases in runoff into Pearl Harbor.

The landfill inspection was conducted on 30 October 2012. No significant changes from the previous inspection were noted, except areas of bare ground observed in January 2010 that had since grown back were barren again.

No monitoring data for 2013 was collected. In addition, no soil vapor sampling had been collected at the time of this report.

5.4 SITE INSPECTION

A five-year review site inspection at the Ford Island Landfill was conducted on 23 July 2013 to assess the operations and effectiveness of LUCs at the site. A follow-up site inspection was conducted on 12 September 2013 to observe recently installed LUC signage. During the site visits, the weather was sunny and the temperature averaged in the mid 70 degrees Fahrenheit. As observations were made, a five-year review site inspection checklist was completed to document the status of the site (see Attachment A).

No significant issues were identified regarding the LUC areas, except for evidence of vehicular traffic on the vegetative cover. Findings of the site inspection are described below.

No evidence of large holes, subsidence, or slope instability was observed that may compromise the protectiveness of the landfill cap. Small holes were present in the ground on the northwest part of the site adjacent to the shoreline. Although fishing was not observed at the time of the site inspection, shoreline fishing has been observed in the area and it is possible that the holes were created to anchor fishing poles. The holes were estimated to be around 6 inches deep. The site was mostly vegetated with grass, except for a few bare patches of soil on the southwest slopes facing Pearl Harbor. Some areas of dry grass were observed.

Small shrubs were growing at the ends of the drainage swale, which discharges storm water to Pearl Harbor at the northwest and southwest corners of the site. The vegetation potentially obstructs the flow of storm water; however, there was no water in the swale at the time of the inspection. Other than the discharge points, the swale appeared to be in good condition. A few cracks between concrete sections of the swale were growing minor amounts of weeds; however, the vegetation was not large enough to obstruct water flow. Various small shrubs and trees are intermittently growing in the rip-rap bordering the shoreline. The rip-rap appeared to be intact and still protective of the site shoreline.

In general, the monitoring well covers need maintenance. Four LUC signs are present around the site's perimeter. During the 23 July 2013 site inspection the signs read: "No Parking On Grass." When the site was revisited on 12 September 2013, the signs had been replaced with more signs that read: "No Digging Or Vehicles, Subsurface Soil Contamination, For Additional Information Contact: NAVFAC Environmental Office 471-1171 x229." There was evidence of vehicular traffic in some areas. It could not be determined if the tire marks were from maintenance activities or unauthorized entry.

Photographs from the site visit are presented in Attachment B.

5.5 INTERVIEWS

Interviews were conducted with the following personnel:

Name	Affiliation	Date
Maria Reyes	DOH, Regulatory Project Manager	14 November 2013
Christopher Lichens	EPA, Regulatory Project Manager	12 November 2013
Jan Kotoshirodo	NAVFAC Hawaii, RPM	15 November 2013

NAVFAC Naval Facilities Engineering Command

All three personnel agreed that the remedy is functioning well. The Naval Facilities Engineering Command (NAVFAC) RPM and DOH regulatory project manager expressed concerns with the maintenance of the vegetative cap. Both indicated that the sprinkler system has had issues and needs to be maintained. The NAVFAC RPM elaborated by indicating that the sprinklers have been costly to maintain because of damage, disconnected water lines, and the water itself. The EPA regulatory project manager indicated that soil gas monitoring still needs to be evaluated.

Interview forms are presented in Attachment C.

6. Technical Assessment

Answers to the following three key technical questions are presented in tabular format below:

- A: Is the remedy functioning as intended by the decision documents?
- B: Are the assumptions used at the time of remedy selection still valid?
- C: Does any other information call into question the protectiveness of the remedy?

A review of the conceptual site model for the Ford Island Landfill site indicated that no significant changes to land use or site conditions have occurred that would affect the remedy effectiveness.

SITE: FORD ISLAND LANDFILL
QUESTION A: Is the remedy functioning as intended by the decision documents?

Element	Assessment
Remedial Action Performance	The final remedy implemented at the Ford Island Landfill is LUCs and includes the containment system and long-term monitoring. LUCs are the non-technical and non-engineering actions that will help mitigate potential risks to human health and the environment by restricting access to contaminated media. The current land use at the Ford Island Landfill will be maintained to reduce the possibility of exposure to constituents under other land use scenarios. Continued maintenance of the landfill containment system prevents direct contact of underlying contaminated soil and debris and the migration or relocation of contaminated soil to areas where human or ecological exposure could occur.
System Operations/O&M	No active systems are in place; however, semi-annual groundwater monitoring was being conducted until 2012 and was to be conducted annually starting in 2013. The 2013 annual long-term monitoring event was performed in Aug 2013 (34th event). However, the final report has not been completed as of the publication of this report and therefore, the results were unavailable for review.
Cost of Systems Operations/O&M	No cost variances were identified that suggest the remedy is not properly functioning, except for costs associated with maintenance of the sprinkler system (see Section 5.5).
Opportunities for Optimization	Currently groundwater monitoring is conducted on an annual basis and metals concentrations appear to be decreasing. During the next five-year review, the sampling frequency and locations should be evaluated to potentially reduce monitoring costs.
Early Indicators of Potential Remedy Failure	The remedy is functioning as intended, except unauthorized driving on the landfill cap appears to be an ongoing issue. Although the swale surrounding the site is steep enough in most areas to prevent vehicular access, there is one particularly shallow area that is likely used for site entry. No significant cap damage has been observed; however continued vehicular damage may compromise or damage the vegetative cap, sprinkler system, or other features of the containment system.
Implementation of Institutional Controls and Other Measures	Although access to the Ford Island Landfill site is not specifically controlled, JBPHH is a secure facility and entry is restricted and vigorously enforced. Administrative processes and procedures are in place that require approval for all projects involving construction, digging, or subsurface disturbance. These procedures involve coordination and approval by NAVFAC Hawaii environmental personnel for projects located in or near an environmental restoration site, and includes sites that have LUCs. The Navy will ensure these or similar processes and procedures remain in place and are complied with for all proposed construction, digging, and subsurface soil disturbing activities.

SITE: FORD ISLAND LANDFILL **QUESTION B: Are the assumptions used at the time of remedy selection still valid?**	
Element	**Assessment**
Changes in Standards and TBC Requirements	Regulatory requirements were considered in the selection of the final remedy. Changes to the ARARs developed for the Ford Island Landfill site are evaluated in Section 5.2. Chemical-specific ARARs that impact cleanup levels are discussed under Changes in Toxicity and Other Contaminant Characteristics below.
Changes in Exposure Pathways and Land Use	A landfill containment system was installed in December 1996, and consists of a permeable and vegetative soil cap, a drainage trench, a groundwater monitoring network, and shoreline protection along Pearl Harbor. These features are inspected on a regular basis. At the time of the ROD, the Ford Island Landfill Site was a vegetated, undeveloped parcel used as an open recreational space located along the western edge of Ford Island, along the Pearl Harbor shoreline. No changes in land use were observed during the site inspection. The site is zoned for restricted land use (industrial/commercial) and is expected to remain the same in the future. No significant change in exposure pathways has occurred at the site. Receptor populations are also the same. However, the inspection did note that the adjacent Pearl Harbor has been used for fishing.
Changes in Toxicity and Other Contaminant Characteristics	The Ford Island Landfill site was initially investigated during a 1992 Site Inspection (Ogden 1993). A streamlined risk evaluation was conducted and presented in the EE/CA (Ogden 1995) prior to the emplacement of the landfill containment system, which was installed in 1996. The Navy has selected LUCs, including maintenance of the landfill containment system and long-term monitoring as the final remedy. A human health risk evaluation was conducted and presented in the EE/CA (Ogden 1995). Table 6-1, Table 6-2, and Table 6-3 compare the original PRGs used in evaluating the risk estimates with current screening criteria (EPA 2013). Table 6-1 presents the risk evaluation for COCs and detected COPCs in soil. Of the 46 analytes detected in soil, 33 had a reduction in screening criteria. The following analytes had a reduction in screening criteria, but the current risk remained within the acceptable range: Aroclor 1260, benzo(b)fluoranthene, benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene. The analytes that had a MDC exceeding the screening criteria and posed an unacceptable risk include arsenic, copper, antimony, lead, and thallium. Arsenic, copper, and lead continue to be part of the long-term monitoring and have exceeded screening criteria in recent monitoring events. The risk evaluation was conducted prior to the emplacement of the landfill containment system, which was installed in 1996. As a result, the actual health risks will be much lower than the potential health risks identified in the risk evaluation due to the presence of the containment system. The evaluation of groundwater (Table 6-2) and surface water (Table 6-3) showed that concentrations of several COCs, including arsenic, copper, lead, mercury, and nickel, exceeded the current surface water standards and therefore posed unacceptable ecological risk. Construction of the landfill containment system was completed to (1) prevent contaminated surface soil from eroding and entering Pearl Harbor, and (2) reduce infiltration of precipitation into the landfill, thereby reducing the possibility of contaminants leaching to groundwater and entering Pearl Harbor. In addition, these changes do not call into question the protectiveness of the remedy for the Ford Island Landfill site because the LUCs restrict use to industrial/commercial activities.
Changes in Risk Assessment Methodologies	The risk evaluation was conducted prior to the placement of the landfill containment system, which was installed in 1996. As a result, the actual health risks will be much lower than the potential health risks identified in the risk evaluation due to the presence of the containment system. Potentially exposed populations evaluated under the current land use conditions included adult and child onsite visitors and recreational fishermen. As the development plan for Ford Island has incorporated the landfill as a recreational area, exposed populations under the future land use is equivalent to that under current land use. Changes in risk assessment methodologies since the ROD was prepared include changes in the estimation of risk from exposure to chemicals via inhalation, and the consideration of the mutagenic mode of action with regard to child receptors. Therefore, it is recommended that soil gas sampling is conducted to ensure that landfill gases (i.e., methane) or VOCs are not present in soil vapor at concentrations that could affect human receptors. A one-time soil gas sampling event has been incorporated into the long-term monitoring plan for Ford Island Landfill site.
Remedy Byproducts	No remedy byproducts have been identified to consider in this assessment, except landfill gases. However, a one-time sampling of landfill gases and VOCs has been incorporated into the revised long-term monitoring plan (AECOM 2013).

Site: Ford Island Landfill **Question B: Are the assumptions used at the time of remedy selection still valid?**	
Element	**Assessment**
New Contaminants and Contaminant Sources	No new contaminants or contaminant sources have been identified, except an additional concern of soil vapor at the site that may contain elevated levels of landfill gas (i.e., methane) or VOCs that could potentially migrate from underneath the cap and impact receptors on the land surface or in nearby residences. Therefore, soil gas sampling has been incorporated into the revised long-term monitoring plan (AECOM 2013). As of the publication of this report, soil vapor sampling had not been conducted.
Expected Progress Toward Meeting RAOs	Human health risk at these sites has been addressed by the installation of the landfill containment system and ROD documentation that led to the LUCs that have been implemented at the Ford Island Landfill site. No change has occurred in the physical condition of the Ford Island Landfill site that would affect the protectiveness of the remedy. Items identified in previous landfill monitoring reports as needing maintenance may need to be addressed. Exposure assumptions, cleanup levels, and RAOs remain valid for the selected remedy. The RAOs for the Ford Island Landfill site are still appropriate.

ARAR applicable or relevant and appropriate requirement
COPC chemical of potential concern
RAO remedial action objective
TBC to be considered
VOC volatile organic compound

Table 6-1: Ford Island Landfill Review of Soil Human and Ecological Health Toxicity Data Used in Risk Assessment

Detected Analyte	MDC within LUC Area (mg/kg)	Original Industrial EE/CA PRG (mg/kg)	Does MDC Exceed Original PRG?	Current (May 2013) Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Residential Cancer Risk [a] Based on Current PRG and MDC	Residential Noncancer HI [b] Based on Current PRG and MDC	Conclusion
COCs											
Arsenic	241	2	Yes	0.61	Cancer	Yes	16	Yes	4.0E-04	NA	MDC still exceeds PRG and background; current risk is above acceptable cancer risk range of 1E-04 to 1E-06.
Beryllium	2.3	1.1	Yes	160	Noncancer	No	2.5	No	NA	1.4E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Copper	8,930	63,000	No	3,100	Noncancer	Yes	110	Yes	NA	2.9E+00	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Mercury	3.3	510	No	10	Noncancer	No	9	No	NA	3.3E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Aroclor-1260	16	0.34	Yes	0.22	Cancer	Yes	NA	NA	7.3E-05	NA	MDC still exceeds PRG; however, current risk is within acceptable cancer risk range of 1E-04 to 1E-06.
Detected COPCs											
Antimony	466	680	No	31	Noncancer	Yes	7.3	Yes	NA	1.5E+01	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Cadmium	33.9	850	No	70	Noncancer	No	2.3	Yes	NA	4.8E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Chromium	283	1,600	No	12,000	Noncancer	No	250	Yes	NA	2.4E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Lead	3,900	1,000	Yes	400	Noncancer	Yes	29	Yes	NA	9.8E+00	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Nickel	296	34,000	No	1,500	Noncancer	No	0.29	Yes	NA	2.0E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Silver	55.2	8,500	No	390	Noncancer	No	9	Yes	NA	1.4E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Thallium	1.2	120	No	0.78	Noncancer	Yes	0.86	Yes	NA	1.5E+00	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.

Detected Analyte	MDC within LUC Area (mg/kg)	Original Industrial EE/CA PRG (mg/kg)	Does MDC Exceed Original PRG?	Current (May 2013) Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Residential Cancer Risk [a] Based on Current PRG and MDC	Residential Noncancer HI [b] Based on Current PRG and MDC	Conclusion
Zinc	11,100	100,000	No	23,000	Noncancer	No	2.7	Yes	NA	4.8E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
α-chlordane	0.025	1.5	No	1.6	Cancer	No	166	No	1.6E-08	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Γ-chlordane	0.021	1.5	No	1.6	Cancer	No	NA	NA	1.3E-08	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
4-4'-DDD	0.76	7.9	No	2	Cancer	No	NA	NA	3.8E-07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
4-4'-DDE	1.1	5.6	No	1.4	Cancer	No	NA	NA	7.9E-07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
4-4'-DDT	0.43	5.6	No	1.7	Cancer	No	NA	NA	2.5E-07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Coumaphos	0.31	NA	No	NA	NA	No	NA	NA	NA	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Monocrototophos	0.57	NA	No	NA	NA	No	NA	NA	NA	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
2,4-D	0.032	6,800	No	690	Noncancer	No	NA	NA	NA	4.6E-05	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Dalapon	0.63	20,000	No	1,800	Noncancer	No	NA	NA	NA	3.5E-04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Dicamba	0.005	20,000	No	1,800	Noncancer	No	NA	NA	NA	2.8E-06	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Dichlorprop	0.015	NA	No	NA	NA	No	NA	NA	NA	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Acetone	0.87	8,400	No	61,000	Noncancer	No	NA	NA	NA	1.4E-05	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Detected Analyte	MDC within LUC Area (mg/kg)	Original Industrial EE/CA PRG (mg/kg)	Does MDC Exceed Original PRG?	Current (May 2013) Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Residential Cancer Risk [a] Based on Current PRG and MDC	Residential Noncancer HI [b] Based on Current PRG and MDC	Conclusion
Toluene	0.075	2,700	No	5,000	Noncancer	No	NA	No	NA	1.5E-05	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
2-butanone	0.043	34,000	No	28,000	Noncancer	No	NA	No	NA	1.5E-06	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Trichloroethene	0.052	17	No	0.91	Cancer	No	NA	No	5.7E-08	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Tetrachloroethene	0.006	25	No	22	Cancer	No	NA	No	2.7E-10	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Carbon disulfide	0.002	52	No	820	Noncancer	No	NA	No	NA	2.4E-06	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
4-methyl -2-pentanone	0.003	55,000	No	5,300	Noncancer	No	NA	No	NA	5.7E-07	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Pyrene	0.81	20,000	No	1,700	Noncancer	No	NA	No	NA	4.8E-04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Chrysene	0.57	24	No	15	Cancer	No	NA	No	3.8E-08	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Bis(2-ethylhexyl) phthalate	0.65	140	No	35	Cancer	No	NA	No	1.9E-08	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Di-n-butylphthalate	0.32	68,000	No	6,100	Noncancer	No	NA	No	NA	5.2E-05	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Benzo(b)fluoranthene	0.56	2.6	No	0.15	Cancer	Yes	NA	No	NA	NA	MDC still exceeds PRG and background; current risk is within acceptable cancer risk range of 1E-04 to 1E-06.
Benzo(a) anthracene	0.56	2.6	No	0.15	Cancer	Yes	NA	No	3.7E-06	NA	MDC still exceeds PRG and background; current risk is within acceptable cancer risk range of 1E-04 to 1E-06.
Benzo(a)pyrene	0.32	0.26	Yes	0.015	Cancer	Yes	NA	No	2.1E-05	NA	MDC still exceeds PRG and background; current risk is within acceptable cancer risk range of 1E-04 to 1E-06.

Detected Analyte	MDC within LUC Area (mg/kg)	Original Industrial EE/CA PRG (mg/kg)	Does MDC Exceed Original PRG?	Current (May 2013) Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Residential Cancer Risk [a] Based on Current PRG and MDC	Residential Noncancer HI [b] Based on Current PRG and MDC	Conclusion
Fluoranthene	0.76	27,000	No	2,300	Noncancer	No	NA	No	NA	3.3E-04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Dibenz(a,h) anthracene	0.21	0.26	No	0.015	Cancer	Yes	NA	No	NA	NA	MDC still exceeds PRG and background; current risk is within acceptable cancer risk range of 1E-04 to 1E-06.
Butylbenzyl-phthalate	0.49	100,000	No	260	Cancer	No	NA	No	1.9E-09	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Phenanthrene	1.6	NA	No	NA	NA	No	NA	No	NA	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
2-methylnaphthalene	0.2	NA	No	230	Noncancer	No	NA	No	NA	8.7E-04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Dibenzofuran	0.38	2,700	No	78	Noncancer	No	NA	No	NA	4.9E-03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Naphthalene	0.4	800	No	3.6	Cancer	No	NA	No	1.1E-07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Fluorene	0.13	300	No	2,300	Noncancer	No	NA	No	NA	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Sources: MDCs (DON 2011), Original PRGs (EPA 2009), Current PRGs (EPA 2013).
DDD dichlorodiphenyldichloroethane
DDE dichlorodiphenyldichloroethylene
DDT dichlorodiphenyltrichloroethane
HI hazard index
MDC maximum detected concentration
NA not available
NC noncancer
[a] Industrial cancer risk is derived using the following equation: (MDC/Current PRG) x (target risk level [1E-06]).
[b] Industrial non-cancer HI is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).

Table 6-2: Ford Island Landfill Review of Groundwater Ecological Health Toxicity Data Used in Risk Assessment

Detected Analyte	MDC within LUC Area (µg/L)	Original 1995 ARAR (µg/L)	Does MDC Exceed Original PRG?	Current DOH 2012 PRG Surface Water Standards (µg/L)	Does MDC Exceed Current PRG?	Ecological Risk (HI) [a] Based on Current PRG and MDC	Conclusion
COCs							
Arsenic	54.2	0.0175	Yes	36	Yes	1.5E+00	MDC still exceeds PRG; current ecological HI is above 1.0.
Copper	31.8	2.9	Yes	2.9	Yes	1.1E+01	MDC still exceeds PRG; current ecological HI is above 1.0.
Lead	72.8	8.5	Yes	5.6	Yes	1.3E+01	MDC still exceeds PRG; current ecological HI is above 1.0.
Mercury [b]	0.22	0.025	Yes	0.025	Yes	8.8E+00	MDC still exceeds PRG; current ecological HI is above 1.0.
Nickel [b]	26.3	8.3	Yes	8.3	Yes	3.2E+00	MDC still exceeds PRG; current ecological HI is above 1.0.
Zinc	79.1	86	No	86	No	9.2E-01	MDC still exceeds PRG; current ecological HI is above 1.0.
Detected COPCs							
Antimony	25.5	500	No	NA	No	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
2-Butanone	2	NA	No	NA	No	NA	No ecologically based screening criteria is available for evaluation.
Carbon disulfide	2	NA	No	NA	No	NA	No ecologically based screening criteria is available for evaluation.
2-hexanone (MBK)	4	NA	No	NA	No	NA	No ecologically based screening criteria is available for evaluation.
Coumaphos	5.3	NA	No	NA	No	NA	No ecologically based screening criteria is available for evaluation.
4,4-DDT	0.05	0.000008	Yes	NA	No	NA	The MDC exceeds the original ARAR, however no current ecologically based screening criteria is available for evaluation.
Fensulfothion	7.7	NA	No	NA	No	NA	No ecologically based screening criteria is available for evaluation.

Sources: MDCs (DON 2011), Original and Current PRGs (State of Hawaii Surface Water Standards).
MBK methyl butyl ketone
NA not available
[a] Ecological risk (HI) is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).
[b] No MDC listed in EE/CA, MDC from ROD, Table 3 (DON 2011).

Table 6-3: Ford Island Landfill Review of Surface Water Ecological Health Toxicity Data Used in Risk Assessment

Detected Analyte	MDC within LUC Area (µg/L)	Original PRG (µg/L)	Does MDC Exceed Original PRG?	Current DOH 2012 Surface Water Standards (µg/L)	Does MDC Exceed Current PRG?	Ecological Risk (HI) [a] Based on Current PRG and MDC	Conclusion
COCs							
Arsenic	5.4	36	No	36	No	1.5E-01	The MDC does not exceed the current PRG and ecological risk associated with the MDC is acceptable.
Copper	100	2.9	Yes	2.9	Yes	3.4E+01	MDC still exceeds PRG; current ecological HI is above 1.0.
Lead	6.8	5.6	Yes	5.6	Yes	1.2E+00	MDC still exceeds PRG; current ecological HI is above 1.0.
Mercury	0.14	0.025	Yes	0.025	Yes	5.6E+00	MDC still exceeds PRG; current ecological HI is above 1.0.
Nickel	22	8.3	Yes	8.3	Yes	2.7E+00	MDC still exceeds PRG; current ecological HI is above 1.0.
Zinc	44	86	No	86	No	5.1E-01	The MDC does not exceed the current PRG and ecological risk associated with the MDC is acceptable.
Detected COPCs							
Silver	0.031	NA	No	NA	No	NA	No ecologically based screening criteria is available for evaluation.
Aroclor 1260 [b]	0.00031	NA	No	0.03	No	1.0E-02	MDC still exceeds PRG; current ecological HI is above 1.1.

Sources: MDCs (DON 2011), Original and Current PRGs (State of Hawaii Surface Water Standards).
NA not available
[a] Ecological risk (HI) is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).
[b] Current DOH screening level based on Total PCBs, not just Aroclor 1260.

SITE: FORD ISLAND LANDFILL QUESTION C: Does any other information call into question the protectiveness of the remedy?	
Element	**Assessment**
Overall	No other information has been identified that would call into question the protectiveness of the remedy.

7. Issues, Recommendations, and Follow-up Actions

Issues identified during the site inspection and interviews are listed in Table 7-1.

Table 7-1: Issues and Recommendations for the Ford Island Landfill Site

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Affects Protectiveness? (Y/N)	
				Current	Future
Although soil vapor sampling was incorporated into a revised long-term monitoring plan finalized in July 2013, the results were not available for review.	Soil vapor sampling will be conducted during the next annual sampling event scheduled for August/September 2014. During the next five-year review, soil vapor results should be evaluated.	Navy	EPA/DOH	N	Y
Currently, groundwater monitoring is scheduled to be conducted on an annual basis. However, groundwater monitoring results for 2013 were not available for review. Based on previous groundwater monitoring data, metals concentrations appear to be decreasing.	During the next five-year review, the sampling frequency and locations should be evaluated to optimize the monitoring plan.	Navy	EPA/DOH	N	N
Unauthorized driving on the landfill may compromise the future integrity of the soil cap.	If unauthorized driving continues to occur and damage to the cap is observed, consider installing chains and bollards or a similar restriction to prevent vehicle access via the shallow portion of the swale.	Navy	EPA/DOH	N	Y
Vegetation growing in swale outlets may affect the discharge of surface runoff from the site.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Navy	EPA/DOH	N	Y
Vegetation growing in rip-rap could affect shoreline protection.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Navy	EPA/DOH	N	Y
Ongoing issues with the sprinkler system include the disabling of individual sprinkler heads by recreational visitors and fishermen. Exposed soil and dry grass was observed during the site inspection.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Navy	EPA/DOH	N	Y
Monitoring well MW-6 was observed without a lock; other wells had vaults that were missing bolts.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Navy	EPA/DOH	N	N

8. Protectiveness Statement

The remedy at the Ford Island Landfill site, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. The containment system and its components should be maintained to prevent future exposure and sampling should be conducted regularly.

No changes in land use are expected in the foreseeable future.

9. References

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First Five-Year CERCLA Review
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Ford Island Landfill

Attachment A: Five-Year Review Site Inspection Checklist

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. "N/A" refers to "not applicable."

I. SITE INFORMATION	
Site Name: Ford Island Landfill (FILF)	**Date of Inspection:** July 23, 2013
Location and Region: Honolulu, HI	**EPA ID:** HI4170090076
Agency, office or company leading the five-year review: NAVFAC Hawaii /AECOM	**Weather/temperature:** Sunny, mid 70s °F
Remedy Includes: (Check all that apply) ☒ Landfill cover/containment ☐ Access controls ☒ Institutional controls ☐ Groundwater pump and treatment ☐ Surface water collection and treatment ☒ Other – LTMM and LUCs	
Attachments: ☐ Inspection team roster attached Inspection Team Members: Dustin Goto (AECOM) Teresa Quiniola (AECOM)	☐ Site map attached

II. INTERVIEWS (Check all that apply)

1.	**O&M Site Manager**	☒ N/A
2.	**O&M Staff**	☒ N/A

3. Local regulatory authorities and response agencies (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency <u>Hawaii Department of Health</u>

Contact	<u>Name</u>	<u>Title here</u>	<u>Date</u>	<u>Phone Number</u>
	Maria Reyes	Regulatory Project Mgr.	14 November 2013	808-586-4653

Agency <u>EPA Region 9</u>

Contact	<u>Name</u>	<u>Title here</u>	<u>Date</u>	<u>Phone Number</u>
	Christopher Lichens	Regulatory Project Mgr.	12 November 2013	415-972-3149

Problems, suggestions: ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Remarks:

4. Other interviews (optional) ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Jan Kotoshirodo, NAVFAC RPM

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents ☒ Readily available ☐ Up to date ☐ N/A
Remarks: The most current monitoring data available at the time of the review was collected in October 2012 (Element 2013).

2. Site-Specific Health and Safety Plan ☒ Readily available ☒ Up to date ☐ N/A

3. O&M and OSHA Training Records ☐ Readily available ☐ Up to date ☒ N/A

4. Permits and Service Agreements ☐ Readily available ☐ Up to date ☒ N/A

5. Gas Generation Records ☐ Readily available ☐ Up to date ☒ N/A

6. Settlement Monument Records ☐ Readily available ☐ Up to date ☒ N/A

7. Groundwater Monitoring Records ☒ Readily available ☐ Up to date ☐ N/A
Remarks: 2013 data was not available at the time of the review.

8. Leachate Extraction Records ☐ Readily available ☐ Up to date ☒ N/A

9. Discharge Compliance Records ☐ Readily available ☐ Up to date ☒ N/A

10. Daily Access/Security Logs ☐ Readily available ☐ Up to date ☒ N/A

IV. O&M COSTS

1. O&M Organization
☐ N/A ☐ Contractor for State
☐ Other ☒ Contractor for PRP

2. O&M Cost Records
☐ Readily available ☐ Up to date
☒ Funding mechanism/agreement in place ☐ Breakdown attached
Original O&M cost estimate N/A

3. Unanticipated or Unusually High O&M Costs During Review Period
Remarks: None, except for costs incurred maintaining the irrigation system due to recreational users the site and nearby construction.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on map ☐ Gates secure ☒ N/A

B. Other Access Restrictions

1. Signs and other security measures ☒ Signs ☐ N/A
Remarks: Three signs restricting “parking on grass” were present at the time of the initial site inspection on 23 July 2013. The site was revisited on 12 September 2013, and it was observed that each of the original signs had been supplemented with an additional sign that read: “No Digging or Vehicles, Subsurface Soil Contamination, For Additional Information Contact: NAVFAC Environmental Office 471-1171 x229”. A fourth “No Digging or Vehicles” sign was also present along the south border of the site.
The Ford Island Landfill site is located within JBPHH, which has restricted access.

C. Institutional Controls

1. Implementation and enforcement
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☒ Yes ☐ No ☐ N/A

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

Type of monitoring (e.g., self-reporting, drive by) Landfill maintenance and monitoring and groundwater monitoring is proposed to be conducted on an annual basis. However, no data for 2013 was available for review.

Frequency: see above

Responsible party/agency NAVFAC Hawaii

Contact

Name	Title	Date	Phone No.
Jan Kotoshirodo	RPM	15 November 2013	808-471-1171 X 341

Reporting is up-to-date ☐ Yes ☒ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: Patches of bare soil along the landfill cover were observed during the site inspection. Dry vegetation was also observed. Soil vapor monitoring data has not been collected.

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: Recommend a physical barrier or security measures to prevent vehicular access. Irrigation system needs to be maintained.

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks: No vandalism was evident; however, tire marks on the landfill cover suggest unauthorized vehicle usage. Prior observations by personnel conducting the site inspection include people fishing from the site shoreline and rocks placed on sprinkler heads.

2. Land use changes on site ☒ N/A

3. Land use changes off site ☒ N/A

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

B. Other Site Conditions ☒ N/A

Remarks: Bare patches of soil were observed in the northwest area of the site. Prior observations by personnel conducting the site inspection include fishermen using rocks as weights on sprinkler heads.

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. Settlement (Low spots) ☐ Location shown on site map ☒ Settlement not evident

Remarks: Settlement of abandoned monitoring well MW-8 was observed.

2. Cracks ☐ Location shown on site map ☒ Cracking not evident

3. Erosion ☐ Location shown on site map ☒ Erosion not evident

4. Holes ☐ Location shown on site map ☒ Holes not evident

VII. LANDFILL COVERS (cont'd)

5. Vegetative Cover ☒ Grass ☐ Cover properly established ☐ No signs of stress ☐ Trees/Shrubs

Remarks: Bare patches of soil were observed on the slopes of the landfill. Although dry vegetation was also observed, it appeared to be keeping the soil in place at the time of the inspection.

6. Alternative Cover (armored rock, concrete, etc.) ☒ N/A

7. Bulges ☐ Location shown on site map ☒ Bulges not evident

8. Wet Areas/Water Damage ☒ Wet areas/water damage not evident

9. Slope Instability ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Remarks: Bare patches of soil and dry vegetation were observed on the slopes of the landfill. These should be vegetated to prevent erosion and instability.

B. Benches ☒ Applicable ☐ N/A

1. Flows Bypass Bench ☐ Location shown on site map ☒ N/A or okay

2. Bench Breached ☐ Location shown on site map ☒ N/A or okay

3. Bench Overtopped ☐ Location shown on site map ☒ N/A or okay

C. Letdown Channels ☐ Applicable ☒ N/A

D. Cover Penetrations ☒ Applicable ☐ N/A

1. Gas Vents ☐ Active ☐ Passive ☒ N/A

2. Gas Monitoring Probes ☐ Applicable ☒ N/A

3. Monitoring Wells (within surface area of landfill)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ Evidence of leakage at penetration ☐ Needs O&M ☐ N/A

Remarks: MW-6 does not contain a lock, bolts are missing from several well covers.

4. Leachate Extraction Wells ☐ Applicable ☒ N/A

5. Settlement Monuments ☐ Located ☐ Routinely surveyed ☒ N/A

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

F. Cover Drainage Layer ☒ Applicable ☐ N/A

1. Outlet Pipes Inspected ☐ Functioning ☒ N/A

2. Outlet Rock Inspected ☐ Functioning ☒ N/A

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

H. Retaining Walls ☐ Applicable ☒ N/A

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. Siltation ☐ Location shown on map ☒ Siltation not evident

2. Vegetative Growth ☒ Location shown on map ☐ N/A

Remarks: Minor weeds are growing within cracks between concrete sections of the swale; however, the growth is not large enough to impede water flow.

3. Erosion ☐ Location shown on map ☒ N/A

4. Discharge Structure ☐ Functioning ☒ N/A

Remarks: Shrubs are growing at the two points where the swale discharges to Pearl Harbor. No water was accumulated in the swale at the time of the site visit.

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

C. Treatment System ☐ Applicable ☒ N/A

D. Monitoring Data

1. Monitoring Wells (Natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☒ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: Well covers may need locks and maintenance. Sampling data for 2013 was not available for review.

2. Monitoring Data

☐ Is routinely sampled on time ☒ Is of acceptable quality

3. Monitoring Data Suggests

☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

X. OTHER REMEDIES

The long term maintenance and monitoring of the site includes groundwater monitoring and landfill inspections. Soil vapor monitoring was included as part of the revised long-term monitoring plan, but no data had been collected as of the time of this report.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

The remedial action objectives consist of LUCs and monitoring to minimize potential exposure to contaminated soil and groundwater. Bare areas, dry vegetation, and unauthorized access (i.e., fishing, tire marks on landfill cap) were observed. Although the remedy is functioning as intended, additional maintenance, soil vapor monitoring, and security measures may be necessary to maintain the site.

B. Adequacy of O&M

O&M consists of landfill inspections and water sampling. The irrigation system appears to be inadequate in certain areas, which appear dry or bare.

C. Early Indicators of Potential Remedy Failure

Dry grass and bare areas may eventually lead to erosion of the soil cap. Unauthorized vehicular traffic may also impact the integrity of the soil cap.

D. Opportunities for Optimization

The grass at the site should be regularly irrigated to maintain vegetative cover. Bollards or other security measure should be installed to prevent unauthorized vehicle access on the landfill cap.

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Attachment B: Site Photographs

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

Photograph No. 1: Overview of Ford Island Landfill site, looking northwest.

Photograph No. 2: Vegetation growing in swale outlet at south end of site.

Photograph No. 3: Grass growing in swale outlet at north end of site.

Photograph No. 4: Exposed soil in northwest area of site, looking northwest.

Photograph No. 5: Exposed soil near to shoreline in northwest part of site.

Photograph No. 6: Unlocked monitoring well observed on site.

Photograph No. 7: Signage prohibiting digging and vehicles on the landfill surface.

Photograph No. 8: Vehicle marks in grass on northwest part of site.

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Attachment C: Interview Forms

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

INTERVIEW RECORD

Site Name: Ford Island Landfill **DOH RPM:** Maria Reyes	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 0905**	**Date: 11/14/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Maria Reyes	**Title:** Regulatory Project Manager	**Organization:** DOH-HEER
Telephone No.: 808-586-4249 **Fax No.:** — **E-Mail Address:** maria.reyes@doh.hawaii.gov	**Street Address:** 919 Ala Moana Boulevard, Rm 206 **City, State, Zip:** Honolulu, Hawaii 96814	

Summary of Conversation

1. How long have you been familiar with the project site?
   Since August 2009.
2. What is your overall impression of the project?
   They have a lot of data (groundwater and surface water data); they did a lot of work at the site.
3. Is the remedy functioning as expected? How well is the remedy performing?
   I think it is working well. The maintenance of the cover needs to be monitored; there are still areas where the cover is dry and sprinkler heads are not functioning properly.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   I haven't read any of the recent monitoring reports, but the ones I've seen before show that they're about the same. I don't know if there was an increase or decrease, but I know copper kept coming up because it's in surface water and groundwater.
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No, none of those. DOH doesn't visit routinely; we only visit with the EPA when they schedule a visit.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   Maintenance of the vegetative cap is necessary. Make sure the sprinkler system works to keep the grass lush instead of having dry patches.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   Nothing more than the maintenance of the vegetative cap and fixing broken sprinkler heads.

INTERVIEW RECORD

Site Name: Ford Island Landfill **EPA RPM:** Christopher Lichens	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1000**	**Date: 11/12/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Christopher Lichens	**Title:** Regulatory Project Manager	**Organization:** EPA

Telephone No.: 415-972-3149 **Fax No.:** --- **E-Mail Address:** lichens.christopher@epa.gov	**Street Address:** 75 Hawthorne Street **City, State, Zip:** San Francisco, CA 94105

Summary of Conversation

1. How long have you been familiar with the project site?
   About 4 years.
2. What is your overall impression of the project?
   It is going according to plan. There is still monitoring going on, so there is some pending data out there that we'll have to look at.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes, it is - as far as I know.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   The one thing still outstanding is soil gas monitoring.
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No, not at the moment. We did eliminate some locations and analyses; as far as I know there is nothing else going to happen in that respect.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   The only comment is we will look at the data as it comes in for soil gas, and continue to look at groundwater and surface water.

INTERVIEW RECORD

Site Name: Ford Island Landfill **Navy RPM:** Jan Kotoshirodo	**EPA ID No.:** HI4170090076
Subject: Five-Year Review Information Survey	**Time: 1000** / **Date: 11/15/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Jan Kotoshirodo	**Title:** Navy Project Manager	**Organization:** Navy
Telephone No.: 808-471-1171 ext. 341 **Fax No.:** — **E-Mail Address:** jan.kotoshirodo@navy.mil	**Street Address:** 400 Marshall Road **City, State, Zip:** JBPHH, HI 96860-3139	

Summary of Conversation

1. How long have you been familiar with the project site?
   As RPM since summer 2006, and I also had that site between March 2002-summer 2004.
2. What is your overall impression of the project?
   I think we're at the point of finally getting to the stage where it should be in terms of the CERCLA requirements.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes, it is. It's performing as it should be—as intended.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   I think for the most part we could say it's pretty stabilized. We have really low levels of metals out there, and no big trends.
5. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities, including LUC inspections.
   We do ongoing cap maintenance and groundwater monitoring, so we went from quarterly to semi-annual and now we're going to be switching to annual. Less frequent vegetative mowing because of the Navy's budget in regards to performance-based landscaping.
6. Have there been unexpected costs or difficulties at the site in the last five years (or since the ROD was signed)? Please provide details.
   No. The only challenge has been with the sprinkler system; not a necessity but it ensures the cap remains intact to prevent erosion and cracking. When water lines were updated, the navy disconnected the water line to the landfill, so we've had to deal with that, too. There is a cost to that maintenance for the sprinklers and even the water.
7. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.
8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   No.

INTERVIEW RECORD

Site Name: Ford Island Landfill **Navy RPM:** Jan Kotoshirodo	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1000**	**Date: 11/15/13**

Summary of Conversation (cont'd)

9. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   We had our LTMP reviewed by NAVFAC optimization. No significant changes were made.
10. Do you have any comments, suggestions, or recommendations regarding the project?
    No.

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Building 284 and Former Buildings 80 and 302

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

CONTENTS

Building 284 and Former Buildings 80/302

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
Bldg.	building
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
conc.	concentration
COC	chemical of concern
COPC	chemical of potential concern
CSM	conceptual site model
DD	decision documents
DOH	Department of Health, State of Hawaii
DON	Department of the Navy
DRO	diesel range organics
EPA	Environmental Protection Agency, United States
EPC	exposure point concentration
GRO	gasoline range organics
HI	hazard index
LRO	lube oil range organics
LTMP	long-term monitoring plan
LUC	land use control
JBPHH	Joint Base Pearl Harbor-Hickam
MDC	maximum detected concentration
mg/kg	milligram/kilogram
msl	mean sea level
NAVFAC	Naval Facilities Engineering Command
ND	non-detect
NPL	National Priorities List
O&M	operation and maintenance
PHNC	Pearl Harbor Naval Complex
PRE	preliminary risk evaluation
PRG	preliminary remediation goal
RAB	Restoration Advisory Board
RAO	remedial action objective
RI	remedial investigation
RME	reasonable maximum exposure
ROD	Record of Decision
RPM	remedial project manager
RSE	removal site evaluation
RSL	regional screening level
SRA	screening risk assessment
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
UST	underground storage tank
VOC	volatile organic compound
WP	work plan

1. Site Chronology

The Building (Bldg.) 284 and Former Bldgs. 80/302 Site is a land use control (LUC) site in the Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) sites at Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii. Significant events relevant to this site are presented in Table 1-1 and Table 1-2.

Table 1-1: Bldg. 284 Site Chronology of Events

Event	Date of Event
A review of the shoreline shown on historical aerial photographs in the *Environmental Baseline Survey, Ford Island Geographic Study Area* suggested that fill material was placed along the shore sometime between 1942 and 1952 (Earth Tech 2003a).	1942-1952
Building (Bldg.) 284 was built in 1946 and was used as an aviation engine test cell facility. An unpaved sloped area between Bldg. 284 and the Ford Island Landfill was apparently used for disposal of metal and concrete construction debris (DON 2009).	1946
Metals in surface and subsurface soil (within an unpaved area on the north side of Bldg. 284) were determined to pose an unacceptable health risk to human and terrestrial ecological receptors during the Ford Island Remedial Investigation. A soil removal action was recommended for an area immediately adjacent to Bldg. 284 (Earth Tech 2003b).	2000
Approximately 204 tons of metals-impacted soil was removed from the area northwest of Bldg. 284. The removal action successfully removed the metals-impacted soils, and No Further Action was recommended for the area immediately adjacent to Bldg. 284; however, analytical sampling results indicated that other soil along the shoreline and unpaved slope contained elevated levels of arsenic, cadmium, and lead.	2003
Additional sampling was conducted during a removal site evaluation. Analytical data indicated that groundwater beneath the Bldg. 284 Site was not adversely impacted and that metals were not likely to leach from soils at concentrations that could adversely impact the underlying groundwater (Earth Tech 2007a).	2005
To address metal concentrations in soil along the shoreline and unpaved slope, a time-critical removal action (TCRA) was conducted. This TCRA included the construction of a permeable vegetative soil cap and shoreline revetment over the metals-containing soils to prevent direct exposure to human and ecological receptors and inhibit erosion of soil into the harbor (DON 2009).	2006
A post-removal risk assessment was completed. Several metals were found to exceed their respective screening levels in soil (Earth Tech 2007b).	2007
A record of decision was completed; the final remedies were LUCs, maintenance and inspection of the cap, and long-term monitoring of groundwater (DON 2009).	2009
A LUC work plan was completed for Bldg. 284 and Former Bldgs. 80 and 302. This document provides notice of the LUC establishment and details the monitoring and enforcement mechanisms established to ensure the long-term effectiveness of LUCs (AECOM 2011).	2011
A long-term monitoring plan was completed for Bldg. 284 and Former Bldgs. 80 and 302. This document describes the site inspection and monitoring protocols to ensure the sites remain protective of human health and the environment (AECOM 2013).	2013

Table 1-2: Bldgs. 80 and 302 Site Chronology of Events

Event	Date of Event
Buildings (Bldgs.) 80 and 302 were built prior to 1942 and used as a garage and vehicle maintenance area (DON 2009).	1942
Bldgs. 80 and 302 were demolished (DON 2009).	1982-1994
Elevated metals concentrations were found in surface and subsurface soil within localized areas south of the former Bldgs. 80 and 302 on the west and east side of Independence Street (Earth Tech 2003b).	2003-2006
A time-critical removal action (TCRA) was conducted at the Former Bldgs. 80 and 302 Site. The TCRA consisted of the excavation of surface soil containing elevated concentrations of metals (antimony, arsenic, cadmium, chromium, copper, lead, silver, and zinc), and consolidation of this soil onsite under a 2-foot-thick vegetative soil cap in the grassy area east of Independence Street.	2005-2006

Event	Date of Event
A record of decision was completed; LUCs and maintenance and inspection of the cap were the final remedies (DON 2009).	2009
A LUC work plan was completed for Bldgs. 80 and 302. This document provides notice of the LUC establishment and details the monitoring and enforcement mechanisms established to ensure the long-term effectiveness of LUCs.	2011
A long-term monitoring plan was completed for Bldg. 284 and Former Bldgs. 80 and 302. This document describes the site inspection and monitoring protocols to ensure the sites remain protective of human health and the environment (AECOM 2013).	2013

2. Background

The Bldg. 284 Site and Former Bldgs. 80 and 302 Site are located on Ford Island at JBPHH, Ford Island, Oahu, Hawaii. The sites are part of the PHNC NPL site under the United States Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System Number HI4170090076.

Ford Island is situated in the central portion of Pearl Harbor, incorporating approximately 450 acres over a 1.25-mile-long and 0.62-mile-wide expanse. Access to the island is provided by the Admiral Bernard Clarey (Ford Island) Bridge, which spans the channel between the island and the eastern shore of Pearl Harbor.

2.1 Bldg. 284 Site Description

The Bldg. 284 Site is located at the southwest corner of Ford Island at JBPHH. The site contains the vacant Bldg. 284 structure and an adjacent unpaved sloped area northwest of the building. Bldg. 284 is a large concrete building situated on the Pearl Harbor shoreline. The building includes a concrete deck supported by concrete pillars that extends from the western side of the building over an unpaved shoreline area of Pearl Harbor. The unpaved sloped area, referred to in previous reports as the Bldg. 284 Slope, encompasses approximately 17,250 square feet and slopes steeply towards the Pearl Harbor shoreline. A historic seaplane ramp and a historic concrete pier with associated mooring, and one existing building (Bldg. 255) are located at the north end of the site. The Bldg. 284 Site is bordered to the southeast by the concrete foundation of a former aircraft engine testing facility (Bldg. 8). The areas to the north, east, and south of the Bldg. 284 Site are covered with concrete.

The Bldg. 284 site is bordered to the south by Bldg. 284, to the northwest by a historic seaplane ramp and the Ford Island Landfill, to the east by concrete pavement, and to the west by Pearl Harbor. The restored slope area contains the soil cap that was constructed on top of the contaminated soil and debris (i.e., metal, concrete) and is vegetated with a grass cover. The extent of contaminated soil is contained within the LUC boundaries shown on Figure 1. Rip-rap shoreline protection extends along the entire shoreline at the base of the slope. A historic pier is located along the shoreline at the northwest end of the site.

2.2 Former Bldgs. 80 and 302 Site Description

The Former Bldgs. 80 and 302 Site is located on the south end of Ford Island, approximately 350 feet from the Pearl Harbor shoreline. A site map for the Former Bldgs. 80 and 302 Site is shown on Figure 2. The portion of the site located west of Independence Street, is generally flat, and mostly covered with concrete including the former Bldgs. 80 and 302 foundations and a parking area south of the foundations. Former Bldg. 4 was located in the location of the current parking area, between former Bldgs. 80 and 302 and Bldg. 3. Bldg. 3 is located in the southern portion of the site west of Independence Street. The portion of the site located east of Independence Street is generally a flat, open grassy area with large monkey pod trees. The area includes a vegetative soil cap in the north central portion and a volleyball court and barbeque area in the southern portion.

The Former Bldgs. 80 and 302 Site west of Independence Street contains the concrete slab that served as the foundation for the former buildings, which is used as a boat and marine equipment storage area. A narrow grassy strip, where contaminated surface soil was removed during the Phase 2 removal action, is located south of the concrete foundation. The remaining area to the south includes asphalt pavement and a gravel parking lot. An existing building (Bldg. 3) is located in the southern portion of the site and is used as a boat repair shop, general warehouse, and administration building.

The area east of Independence Street is an open grassy area with Monkey Pod trees and is used for recreational purposes. The area contains the vegetated soil cap in the north central portion of the site and a volleyball area and barbeque area in the southern portion of the site.

2.3 PHYSICAL CHARACTERISTICS

2.3.1 Topography

The land surface of Ford Island is generally less than 20 feet above mean sea level (msl), except for the northeast corner of the island. The land surface rises to over 27 feet above msl in the northeast corner. The highest elevations occur along a line running from the northeast to southwest corners of the island.

2.3.2 Geology and Soils

Ford Island is classified as a coral outcrop by the U.S. Department of Agriculture, Soil Conservation Service (USDA SCS 1972), and consists primarily of coral and cemented calcareous sands. Honolulu Series Salt Lake Volcanics were later deposited on this coralline base; these volcanic rocks most commonly appear on the surface of Ford Island as a weathered volcanic tuff.

In general, soils on the Coastal Plain surrounding Pearl Harbor, including Ford Island, are derived primarily from the caprock formation. The caprock consists of interbedded terrestrial and marine deposits including alluvium eroded from the Koolau Volcanics and coralline limestone sediments. Low-permeability clay and silty clay units in the caprock form confining layers over a deep artesian aquifer in the underlying fractured Koolau basalts (Earth Tech 2006).

Because of past development and land reclamation efforts, significant portions of Ford Island are composed of fill material, consisting of mixtures of gravels, sands, silts, and clays. The fill material consists primarily of on-island derived materials, and the nature of fill deposits varies according to its source, placement method, and its compaction. Fill appears to be generally thickest near the shoreline and thinnest towards the center of the island and where volcanic tuff deposits are observable at the surface (Munro 1981). Changes in the composition, consistency, or placement of the fill material delineate the boundary between fill and in situ material. A significant portion of Ford Island is also covered by concrete and asphalt, which generally overlie fill material.

2.3.3 Groundwater Hydrology

Ford Island is located in the Honolulu–Pearl Harbor basal groundwater aquifer area. The shallow groundwater in the surficial caprock aquifer beneath Ford Island is encountered at approximately sea level. Shallow groundwater on Ford Island is not used for potable purposes and is not hydraulically connected to the basal aquifer of Oahu, which is approximately 460 feet below ground surface (bgs). A direct correlation exists between changes in shallow groundwater elevation underlying Ford Island and tidal fluctuations. The shallow Ford Island groundwater originates from infiltration of precipitation and landscaping irrigation, combined with seawater intrusion. As a result, the shallow groundwater is generally brackish.

Depth to groundwater at Ford Island ranges from approximately 3 feet bgs in wells located along the shoreline to 19 feet bgs in wells located inland. The surficial caprock aquifer occurs from the water table to the first underlying aquitard. The bottom of the aquifer was not encountered during the remedial investigation (RI); however, the aquifer is estimated to be approximately 16 feet thick (Ogden 1995). The aquifer is generally encountered within the weathered volcanic material, coralline debris, and lagoonal deposits.

Groundwater at Ford Island (including the site) is not currently used for drinking water purposes nor is it considered a potential source of drinking water. The shallow caprock groundwater at Ford Island is classified by the State of Hawaii Department of Health (DOH) as "ecologically important" since it discharges to Pearl Harbor (Mink and Lau 1990). Groundwater classification at Ford Island is discussed in detail in the RI report (Earth Tech 2003b).

2.4 BLDG. 284 LAND USE

The Bldg. 284 Site land use is industrial. Bldg. 284 is currently locked and vacant, and the adjacent concrete pad is used for staging construction equipment. The entire site, except for the building, is accessible to any person on Ford Island.

Since the record of decision (ROD) was signed, housing developments have been constructed on the west and north sides of Ford Island; however, there are currently no residential development plans for the Bldg. 284 Site. It is anticipated that future land use for this site will remain commercial/industrial.

2.5 FORMER BLDGS. 80 AND 302 LAND USE

Currently, the area west of Independence Street is used for industrial purposes, including equipment storage, boat repair shop, general warehouse, and administration. The grassy area east of Independence Street is generally used for recreation, such as sporting events and picnics.

It is anticipated that future land use for this site will remain commercial/industrial as well as recreational. At the time the ROD was signed, a housing development was planned for the area north of the Former Bldgs. 80 and 302 Site. No residential area was constructed, but a Child Development Center is located in this area north of the site. It is anticipated that the grassy area east of Independence Street will continue to be used for recreation.

2.6 HISTORY OF CONTAMINATION

2.6.1 Bldg. 284

The Site Summary Report for Bldg. 284 indicated that it was built in 1946 and is a former aviation engine test cell facility. Northwest of Bldg. 284, an unpaved sloped area extends all the way to the Ford Island Landfill. This unpaved sloped area contains metal and concrete construction debris (Earth Tech 1998).

A review of the shoreline shown on historical aerial photographs in the *Environmental Baseline Survey, Ford Island Geographic Study Area* (Earth Tech 2003a) suggests that fill material was placed along the shore sometime between 1942 and 1952. A 1942 aerial photograph indicates that the shoreline was located northeast of its present location; whereas, a 1952 photograph shows a shoreline matching the present location. The Ford Island Landfill was in operation during this 10-year period and reportedly received bulk debris including scrap metal, concrete rubble, and miscellaneous debris (Ogden 1995). Debris observed along the Bldg. 284 Slope site appears to be similar to some of the debris that was reportedly disposed of within the Ford Island Landfill.

There is no record of a water collection or treatment system at the Bldg. 284 Site; therefore, the potential existed for waste to discharge directly into the surrounding soils. There are also documented historical releases from several nearby underground storage tanks (USTs) and an aviation fuel pipeline (DON 2009).

Two environmental investigations have been conducted at the Bldg. 284 site: a 2000 RI (Earth Tech 2003b) and a 2005 Removal Site Evaluation (RSE) (Earth Tech 2007b).

Ford Island RI (Earth Tech 2003b). Monitoring wells were installed in soil borings advanced around Bldg. 284 during April 2000 as part of the Ford Island RI (Earth Tech 2003b). Surface and subsurface soil and groundwater samples collected from the borings and monitoring wells were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH)-gasoline range organics (GRO), TPH-diesel range organics (DRO)/lube oil range organics (LRO), and Target Analyte List metals. The groundwater samples were also analyzed for total dissolved solids and chlorides.

Results of a human health preliminary risk evaluation (PRE) and ecological screening risk assessment (SRA) indicated that metals in surface and subsurface soil at one well location (within an unpaved area on the north side of Bldg. 284) posed unacceptable health risks to human and terrestrial ecological receptors. Results of the risk assessment are presented in the Ford Island RI report (Earth Tech 2003b). The metals of concern were arsenic, beryllium, cadmium, lead, mercury, and selenium. Therefore, a soil removal action was recommended for the area immediately adjacent to Bldg. 284.

Soil and groundwater at other areas of the Bldg. 284 investigation site were determined to be safe for humans and terrestrial and aquatic animals and plants.

In addition to the samples collected during the Bldg. 284 investigation, composite surface soil samples were collected around Bldg. 255 and concrete wipe samples were collected from the concrete-paved area in front of Bldg. 255. The samples were analyzed for PCBs as congeners to assess potential releases associated with a transformer (TB-01). The analytical results indicated the total PCB concentrations for all analyses were below the Toxic Substances Control Act high-occupancy screening criteria of 1 milligram per kilogram (mg/kg) for soil and 10 micrograms per 100 square centimeters for concrete surfaces. Therefore, no further action was recommended for the transformer TB-01 site (Earth Tech 2003b).

RSE (Earth Tech 2007b). Additional sampling was conducted during a RSE in August 2005 to evaluate whether metals in soil could leach to the underlying groundwater at concentrations that would pose unacceptable risks to human or ecological receptors. A summary of the RSE field activities and findings is presented in a technical memorandum. Groundwater samples were collected to evaluate whether groundwater beneath the Bldg. 284 Site has been adversely impacted, and soil samples were collected to evaluate the potential for metals to leach to the groundwater. Analytical data for the August 2005 characterization sampling indicated that groundwater beneath the site has not been adversely impacted and that metals are not likely to leach from site soils at concentrations that could adversely impact the underlying groundwater (Earth Tech 2007b).

2.6.2 Former Bldgs. 80 and 302

Former Bldgs. 80 and 302 were built before 1942 and demolished between 1982 and 1994. The site was a garage and vehicle maintenance area. The grassy area east of Independence Street was a housing area that had been built before 1942.

The former Bldg. 80 garage was equipped with vehicle lifts and grease racks, presumably to perform vehicle maintenance and repair. Potential hazardous substances used at this facility were found in lead-acid batteries, paints, solvents, and petroleum-based fuels and lubricants. Similar vehicle maintenance facilities constructed prior to recent environmental regulations have used sumps, oil/water separators, or dry wells to dispose of used materials and waste.

Potential hazardous substances used at former Bldg. 302 were lead-acid batteries, paints, solvents, and petroleum-based lubricants.

Former Bldg. 4 (located between former Bldgs. 80/302 and Bldg. 3), built in 1922 and demolished in 1997, was used as a boathouse and contained a metal and pipe shop, carpenter and joiner shop, paint shop, and spray booths.

The area east of Independence Street was a former housing area that contained Bldgs. 48 through 53, which were built before 1942. No storage or release of hazardous substances is known to have occurred at the former housing area. Contamination observed east of Independence Street is likely attributable to the historical activities conducted at former Bldgs. 80 and 302 (Earth Tech 1998).

Ford Island RI (Earth Tech 2003b). During the Ford Island RI, former Bldgs. 80 and 302 were investigated to evaluate whether potential chemical releases from past operations have impacted the site. Surface soil, subsurface soil, and groundwater samples were collected and analyzed for VOCs, SVOCs, TPH-GRO, TPH-DRO/LRO, and metals. Groundwater samples were also analyzed for total dissolved solids and chlorides. The RI included a human health PRE and an ecological SRA.

Soil. Results of the human health PRE and ecological SRA indicated that no action was warranted for soil at the site (Earth Tech 2003b). No metals were detected at concentrations above their respective EPA Region 9 human health residential or industrial soil PRGs (EPA 2013). Although metals were detected in subsurface soil at concentrations above background levels, the no action recommendation for soil was made based on the presence of a concrete and asphalt surface cap, which eliminates exposure pathways to ecological receptors.

Groundwater. Results of the human health PRE and ecological SRA in the RI report indicate that no action is warranted for groundwater (Earth Tech 2003b). Results of the human health risk assessment indicated that only one chemical of potential concern (COPC), arsenic, exceeded its tap water preliminary remediation goal (PRG); however, the maximum concentration detected did not exceed its federal maximum contaminant level for drinking water. The concentrations of arsenic detected in groundwater appear to be related to soil background levels, which exceed EPA Region 9 PRGs; therefore, concentrations of arsenic in groundwater were attributed to naturally occurring sources. Results of the ecological risk assessment indicated that metals in groundwater do not pose unacceptable risks to aquatic and benthic receptors after applying an attenuation factor of 10. Therefore, no further action was recommended for groundwater.

2.7 INITIAL RESPONSE

2.7.1 Bldg. 284

Several removal actions have been completed at the Bldg. 284 Site and are discussed below.

UST Removals (October 1996 – February 1997). Five USTs, which were formerly located approximately 70 feet east of the Bldg. 284 Slope site, were removed between October 1996 and February 1997. After the USTs were removed, several soil samples and one groundwater sample were collected and analyzed to investigate potential contamination associated with the USTs. Analytical results indicated that soil concentrations of TPH-LRO and TPH-GRO exceeded action levels, indicating that a release had occurred. Limited over-excavation of soil was performed to remove the fuel-related soil contamination. Subsequently, a monitoring well was installed in August 1998 and a groundwater sample was collected to evaluate the potential impact on groundwater.

No chemicals of concern (COCs) were detected in the groundwater at concentrations above DOH Tier 1 Action Levels (DOH 2000); therefore, no further action was recommended for the site (OHM 1998a).

One UST (UST NSFI-90), located within the northern portion of the Bldg. 284 Site was removed in 1997. Confirmation soil samples were collected from the excavation. The analytical results indicated that total lead concentrations exceeded the DOH Tier 1 Soil Action Level for lead (400 mg/kg). A monitoring well was installed and groundwater was sampled to further assess potential impacts to groundwater. No COCs were detected in the groundwater at concentrations above DOH Tier 1 Action Levels (HAR 11-281-80.1); therefore, no further action was recommended for the site (OHM 1998b).

Additional investigation of UST NSFI-90 was conducted in December 2005 to further evaluate the presence of petroleum COCs at the site. The December 2005 sampling results indicated that elevated concentrations of lead were detected in soil and groundwater; however, based on the data obtained it was concluded that the presence of lead was not likely attributable to the UST. Therefore, the lead contamination found at the UST site was attributed to the Bldg. 284 Installation Restoration site.

Removal Action at Building 284 (June 2003 to October 2003). Based on the recommendations presented in the Ford Island RI (Earth Tech 2003b), a non-time critical removal action (NTCRA) was conducted from June 2003 through October 2003 to address metals contamination detected in soil on the north side of Bldg. 284. The objective of the removal action was to remove impacted soils with metals concentrations that posed unacceptable risks to human and ecological receptors in the vicinity of northwest corner of Bldg. 284 and to replace the excavated soil with clean fill material.

Approximately 204 tons of metals-impacted soil were removed and disposed of off-island. The excavation was approximately 60 feet by 30 feet and between 5 and 9 feet deep. Results of confirmation sampling conducted within the excavation area indicated average exposure concentrations were safe for human and ecological receptors, and no further action was recommended for the area immediately adjacent to Bldg. 284. In addition, three monitoring wells installed during the RI were abandoned, and two abandoned oil–water separators at Bldg. 284 were clean-closed. In closing the two oil-water separators, 1,220 gallons of residual liquids were removed via vacuum truck, and approximately 50 gallons of sludge were excavated from the vaults. The vaults were then pressure-washed and backfilled with clean gravel. All liquid and sludge wastes were drummed and disposed of off site (Shaw 2005).

During the 2003 removal action, large amounts of metal and concrete debris were observed along the shoreline and unpaved slope area located north of the excavation site. Therefore, additional soil sampling was conducted to investigate potential metals contamination in these areas. Analytical sampling results indicated that soil along the shoreline and unpaved slope contained high levels of arsenic, cadmium, and lead. The maximum concentrations detected during the 2003 removal action for these metals were 512 mg/kg, 33 mg/kg, and 4,960 mg/kg, respectively. The additional sampling effort yielded limited subsurface soil data because the drill rig was unable to penetrate subsurface concrete and metal debris encountered within the shoreline and slope areas.

It was determined that the contamination beyond the limits of the area excavated during the 2003 NTCRA to the north of Bldg. 284 was from a different source than the contamination in the area immediately adjacent to Bldg. 284. The contamination along the slope was primarily attributed to the metal and concrete debris. Further evaluation of the data collected and options for further actions were recommended (Shaw 2005).

Removal Action at Building 284 Slope Site (July 2006 to September 2006). To address metals contamination in soil along the Bldg. 284 Slope site, a time-critical removal action (TCRA) was conducted from July to September 2006. The first phase of the removal action consisted of construction of a permeable and vegetative soil cap over soil with elevated metals concentrations. The soil cap consisted of a geotextile layer overlain with 18 inches of engineered fill and 6 inches of clean top soil, which was then revegetated with grass. Closer to the shoreline, a revetment was constructed over the impacted soil to prevent direct exposure to human and ecological receptors and prevent erosion of soil fill into the harbor. The revetment was constructed with rip-rap armor stone placed over a geotextile layer along the shoreline.

The top casing of two existing groundwater monitoring wells were extended to ensure that they would be accessible for future use. In addition, two new monitoring wells were installed for use in future groundwater monitoring activities. A summary of the removal action completed for the Bldg. 284 Slope site is provided in the *Final Remediation Verification Report, Removal Action at Building 284 Slope* (Dawson 2007a).

2.7.2 Former Bldgs. 80 and 302

TCRA (Phase 1 [December 2005 to March 2006] and Phase 2 [June 2006 to July 2006]). A two-phased TCRA was conducted at the Former Bldgs. 80 and 302 Site. Phase 1, conducted from December 2005 to March 2006, addressed lead in areas west of Independence Street that would be affected during planned construction activities and lead and arsenic in areas east of Independence Street that would be affected during construction of a planned boat storage area. Phase 1 consisted of limited excavation and off-island disposal of contaminated soil. Phase 2 was accomplished from June to July 2006 and addressed surface soil contamination in the remaining localized areas east and west of Independence Street. Surface soil containing elevated concentrations of metals (antimony, arsenic, cadmium, chromium, copper, lead, silver, and zinc) was excavated and consolidated on site under a 2-foot-thick vegetative soil cap in the grassy area east of Independence Street.

2.8 BASIS FOR TAKING REMEDIAL ACTION

2.8.1 Bldg. 284 Site

Table 2-1 summarizes the maximum detected concentrations for site-related COCs during all previous investigations and presents associated Oahu caprock soil background levels, and EPA Region 9 residential and industrial soil PRGs. Oahu caprock soil background levels represent natural and anthropogenic background levels of metals contained in the soils overlying the “caprock” sediments along the Oahu coastal plain, within which Ford Island is located. These caprock sedimentary deposits represent interlayered alluvium, marine sediments and weathered Koolau basalt.

Except for arsenic, the data were screened against the 95th percentile of the Oahu caprock soil background concentration range (Earth Tech 2006), which were agreed upon by EPA Region 9 and DOH and finalized in 2006. The Oahu caprock soil background concentrations are considered protective of both human and terrestrial ecological receptors on Ford Island. For arsenic, a cleanup level of 17 mg/kg (site average) and 22 mg/kg (maximum concentration), which exceeds the 95th percentile for arsenic, was established for Ford Island sites. As shown in Table 2-1, antimony, arsenic, cadmium, copper, lead, mercury, and zinc have been detected in soil at concentrations above their screening criteria.

Table 2-1: Maximum Detected Metals Concentrations Remaining in Soil after the Removal Action at the Bldg. 284 Site (DON 2009)

Metal	Maximum Detected Concentration at Site	Depth of Maximum Detected Concentration Prior to Cap Construction (feet bgs)	Oahu Caprock Soil Background Concentrations (Earth Tech 2006)		EPA Region 9 PRGs (EPA 2013)	
			Estimated Background Range	95th Percentile	Residential	Industrial
Antimony	**410**	0–0.5	0.12–8.4	7.3	31	410
Arsenic	**798**	0–0.5	0.21–29	16	0.39	1.6
Beryllium	<0.002	n/a	0.01–3.3	2.5	150	1,900
Cadmium	**33**	3.5–4.0	0.04–3.0	2.3	37	450
Copper	**676**	0–0.5	1.8–230	110	3,100	41,000
Lead	**4,960**	2–2.5	0.19–40 [a] 0.19–203 [b]	29 [a] 96 [b]	400	800
Mercury	**10.8**	0–0.5	0.0035–0.35	0.29	23	310
Nickel	116	0–0.5	1.64–353	205	1,600	20,000
Selenium	11	4–4.5	0.31–11	9.0	390	5,100
Zinc	**12,700**	0–0.5	1.6–193[c]	166 [c]	23,000	100,000

Site screening criteria include background concentrations for Oahu caprock soil.
Concentrations in **boldface** exceed the 95th percentile of the estimated background range for Oahu caprock soil.
bgs below ground surface
n/a not applicable, beryllium was not detected
[a] Lead from natural background sources only.
[b] Lead (Pb) from combined natural/anthropogenic background sources. The anthropogenic Pb background concentration ranges are not intended for direct comparison to site data because anthropogenic Pb background conditions are not controlled by soil type. The Koolau and caprock soil data evaluated for the Environmental Background Analysis represent sites located in developed, populated, and congested areas of Oahu. The distribution of anthropogenic Pb is typically controlled by proximity to anthropogenic sources such as urban development, population, and traffic conditions, not the natural characteristics of the parent rocks. Therefore, these estimated ranges should be used with caution.
[c] Zinc (Zn) background concentrations may be higher, particularly in urban settings, where anthropogenic Zn background sources (primarily automotive-related) are common (De Carlo et al. 2004, 2005).

A Post-Removal Risk Assessment (Earth Tech 2007b) was conducted to evaluate potential risks to human and ecological receptors and is presented in the Bldg. 284 focused feasibility study (Earth Tech 2007b). A conceptual site model (CSM) was developed to identify all current and future human health and ecological exposure pathways for the Bldg. 284 Site.

The human health project screening levels for the COCs at the Bldg. 284 Site were based on EPA Region 9 residential soil PRGs (EPA 2013), with the exception of arsenic. The screening level for arsenic was 17 mg/kg (site average) and 22 mg/kg (maximum allowable concentration) and established based on recommendations from EPA Region 9 (Earth Tech 2003b).

The 95th percentile of the estimated background range for caprock soils on Oahu served as the ecological screening level for metals in soil.

Human Health Risk Assessment. The human health risk assessment quantitatively focused on the potential for human exposure to remaining subsurface soil at the Bldg. 284 Site. Maximum and reasonable maximum exposure (RME) exposure point concentrations (EPCs) for COPCs were compared to the project screening levels and EPA Region 9 residential and industrial PRGs to determine the potential carcinogenic risk and non-cancer hazard estimated for the Bldg. 284 Site under the residential and industrial land use scenarios. The RME EPC was the minimum of either the 95 percent upper confidence limit of the arithmetic mean or the maximum EPC.

The RME EPCs for antimony, arsenic, and lead in subsurface soil exceed their respective human health-based screening levels.

The cumulative maximum and RME carcinogenic risks for subsurface soil are greater than the 10^{-6} point of departure for both the residential and industrial land use scenarios. The cumulative maximum and RME carcinogenic risk for soil under an assumed residential land use is 2E–03 and 3E–04, respectively. The cumulative maximum and RME carcinogenic risk for soil under an assumed industrial land use is 5E–04 and 8E–05, respectively. Arsenic accounts for 100 percent of the estimated risk.

The cumulative non-cancer hazards associated with maximum and RME EPCs in subsurface soil exceed the point of departure of 1 for both the residential and industrial land use scenarios. The cumulative non-cancer hazards associated with maximum and RME EPCs for the residential land use scenario were 50 and 20, respectively. The cumulative non-cancer hazards associated with maximum and RME EPCs for the industrial land use scenario were 4 and 2, respectively. The maximum and RME EPCs for antimony, arsenic, and lead exceeded their respective non-carcinogenic residential PRGs. The maximum EPC for antimony, arsenic, and lead exceed their respective non-carcinogenic industrial PRGs. The RME EPC for antimony exceeds its non-carcinogenic industrial PRG.

The vegetative soil cap and rip-rap revetment over the sloped area of the Bldg. 284 Site effectively prevents potential exposure of humans to unacceptable metals concentrations. On-going monitoring and maintenance of the soil cap/revetment will ensure that it remains protective of human health.

Ecological Risk Assessment. The ecological risk assessment focused on the potential for exposure of wildlife, plants, and soil organisms to surface soil remaining at the Bldg. 284 Site and the potential for contaminated soil to erode into the harbor where it is incorporated into the sediment.

The vegetative soil cap and rip-rap revetment over the sloped area of the Bldg. 284 Site effectively prevents potential exposure of wildlife to unacceptable metals concentrations and prevents erosion of soil into the harbor. There are no unacceptable risks to ecological receptors at the Bldg. 284 Site as long as the protective covers (vegetative soil caps, rip-rap revetment) are maintained. Thus, on-going monitoring and maintenance of the soil cap and revetment will ensure that it remains protective of the environment.

2.8.2 Former Bldgs. 80 and 302 Site

The Former Bldgs. 80 and 302 Site west of Independence Street contains the concrete slab that served as the foundation for the former buildings, which is currently used as a boat and marine equipment storage area. A narrow grassy strip, where contaminated surface soil was removed during the Phase 2 removal action, is located south of the concrete foundation. The remaining area to the south includes asphalt pavement and a gravel parking lot. An existing building (Bldg. 3) is located in the southern portion of the site and is used as a boat repair shop, general warehouse, and administration building.

The area east of Independence Street is an open grassy area with Monkey Pod trees and is used for recreational purposes. The area contains the vegetated soil cap in the north central portion of the site and a volleyball area and barbeque area in the southern portion of the site.

In subsurface soil west of Independence Street, several metals (cadmium, copper, lead, selenium, and zinc) were still detected at levels exceeding the 95th percentile of the estimated background range for Oahu caprock soil. Cadmium, copper, and zinc exceeded the EPA Region 9 PRGs for residential use, but were less than the EPA Region 9 PRGs for industrial use. Lead exceeded the EPA Region 9 PRGs for both residential and industrial use.

In subsurface soil east of Independence Street, several metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc) were still detected at levels exceeding the 95th percentile of the estimated background range for Oahu caprock soil. Antimony, arsenic, chromium, lead, mercury, nickel, silver, and thallium exceeded the EPA Region 9 PRGs for residential use and only lead exceeded the EPA Region 9 PRG for industrial use.

In surface soil east of Independence Street, several metals (arsenic, chromium, copper, lead, selenium, and zinc) were still detected at levels exceeding the 95th percentile of the estimated background range for Oahu caprock soil. Arsenic, chromium, and lead were the only metals to exceed the EPA Region 9 PRGs for residential use and only arsenic exceeded the EPA Region 9 PRG for industrial use.

Table 2-2 summarizes the maximum total metals concentrations remaining in surface and subsurface soil at the site.

Table 2-2: Summary of Maximum Total Metals Concentrations Remaining After Removal Action at the Former Bldgs. 80 and 302 Site (DON 2009)

	Post-Removal Action Conc.		Screening Criteria			
			Oahu Caprock Soil Background Conc.			
Metal	Surface Soil	Subsurface Soil	Upper Estimated Background Conc.	95th Percentile	EPA Region 9 Residential PRG (2004)	EPA Region 9 Industrial PRG (2004)
East of Independence Street						
Antimony	**1.9**	**38.3**	8.4	7.3	31	410
Arsenic	**18**	**88.5**	29	16	0.39	1.6
Beryllium	ND (<0.002)	ND (<0.018)	3.3	2.5	150	1,900
Cadmium	1.9	**49.3**	3	2.3	37	450
Chromium	**278**	**323**	321	250	210	450
Copper	**162**	**27,200**	230	110	3,100	41,000
Lead	**400**	**9,600**	203 [a]	96 [a]	400	800
Mercury	0.23	**2.9**	0.35	0.29	23	310
Nickel	169	**787**	353	205	1,600	20,000
Selenium	**13.9**	**17.3**	11	9	390	5,100
Silver	ND (<0.03)	**3.7**	1	0.86	390	5,100
Thallium	ND (<1.0)	**3.6**	3	2.7	5.2	67
Zinc	**567**	**14,900**	193	166	23,000	100,000
West of Independence Street						
Cadmium	1.2	**73**	3	2.3	37	450
Copper	**112**	**12,300**	230	110	3,100	41,000
Lead	**97.5**	**63,000**	203 [a]	96 [a]	400	800
Selenium	1.7	**63.1**	11	9	390	5,100
Zinc	**212**	**60,900**	193	166	23,000	100,000

Note: All concentrations presented in mg/kg.
Concentrations in **boldface** exceed the 95th percentile of the estimated background range for Oahu caprock soil.
Conc. concentration
ND non-detect (maximum reporting limit shown in parenthesis)
[a] Represents background from combined natural/anthropogenic sources.

Risks to human and ecological receptors were evaluated in the post-removal risk assessment presented in the Remediation Verification Report for the Former Bldgs. 80 and 302 Site (Dawson 2007b) and the Post-Removal Risk Assessment (Earth Tech 2007c). The Former Bldgs. 80 and 302 Site CSM identified all current and future human health and ecological exposure pathways.

Soil samples were collected to assess the extent of metals contamination in surface and subsurface soil at Former Bldgs. 80 and 302 Site east of Independence, and Former Bldgs. 80 and 302 Site west of Independence Street. This risk assessment was conducted using data representative of current site conditions following two TCRAs to evaluate risks to human and ecological receptors remaining at the site. The results of the comparison of COCs to project-specific cleanup goals as well as the estimated cumulative risks and hazards following comparison to residential and industrial EPA Region 9 PRGs (EPA 2013) for each site are summarized below.

Former Bldgs. 80 and 302 Site East of Independence Street. None of the RME EPCs for metals in surface soil exceeded their respective cleanup goals. The carcinogenic risks associated with maximum and RME EPCs in surface soil and subsurface soil including background under residential and industrial scenarios exceed the 10^{-6} point of departure. The carcinogenic risks associated with maximum and RME EPCs in surface soil (including background under the residential scenario) were 5E–05 and 3E–05, respectively. The carcinogenic risks associated with maximum and RME EPCs in surface soil (including background under the industrial scenario) were 1E–05 and 7E–06, respectively. The carcinogenic risks associated with maximum and RME EPCs in subsurface soil (including background under the residential scenario) were 2E–04 and 3E–05, respectively. The carcinogenic risks associated with maximum and RME EPCs in subsurface soil (including background under the industrial scenario) were 6E–05 and 6E-06, respectively. Arsenic accounts for the majority of the risk and also exceeds its carcinogenic residential and industrial PRGs. The RME EPC for arsenic is below its background value and the Ford Island established cleanup goal for arsenic. When the excess cancer risk from chemical concentrations within background range is excluded, the carcinogenic risk estimates associated with maximum and RME EPCs for surface soil no longer exceed the 10^{-6} point of departure. The non-cancer hazards associated with RME EPCs in surface and subsurface soil for industrial land use did not exceed the point of departure of 1. The non-cancer hazards associated with maximum and RME EPCs in subsurface soil for residential land use were 10 and 3, respectively, which exceeded the point of departure of 1. The non-cancer hazards associated with maximum and RME EPCs in surface soil for residential land use did not exceed the point of departure of 1.

The lead hazard quotient (HQ) for small mammals slightly exceeded 1 (HQ = 2). HQ values for the remaining COCs did not exceed 1 for birds or mammals. Because these HQ values are based on a no-effect toxicity reference values, the potential for adverse effects to terrestrial wildlife from surface soil COC exposure is considered acceptable.

Former Bldgs. 80 and 302 Site West of Independence Street. None of the RME EPCs for metals in surface soil exceeded their respective cleanup goals. The RME EPC for lead in subsurface soil exceeded its cleanup goal. The carcinogenic risks associated with RME EPCs in surface and subsurface soil for residential and industrial land use were all less than the 10^{-6} point of departure. The non-cancer hazards associated with RME EPCs in surface and subsurface soil for both industrial and residential land use did not exceed the point of departure of 1. The non-cancer hazard associated with maximum EPCs in subsurface soil for residential land use was 9, which exceeded the point of departure of 1. The non-cancer hazards associated with maximum and RME EPCs in surface soil did not exceed the point of departure of 1.

None of the site soil COCs had HQ values that exceeded 1, therefore the potential for adverse effects to terrestrial wildlife from surface soil COC exposure is considered acceptable.

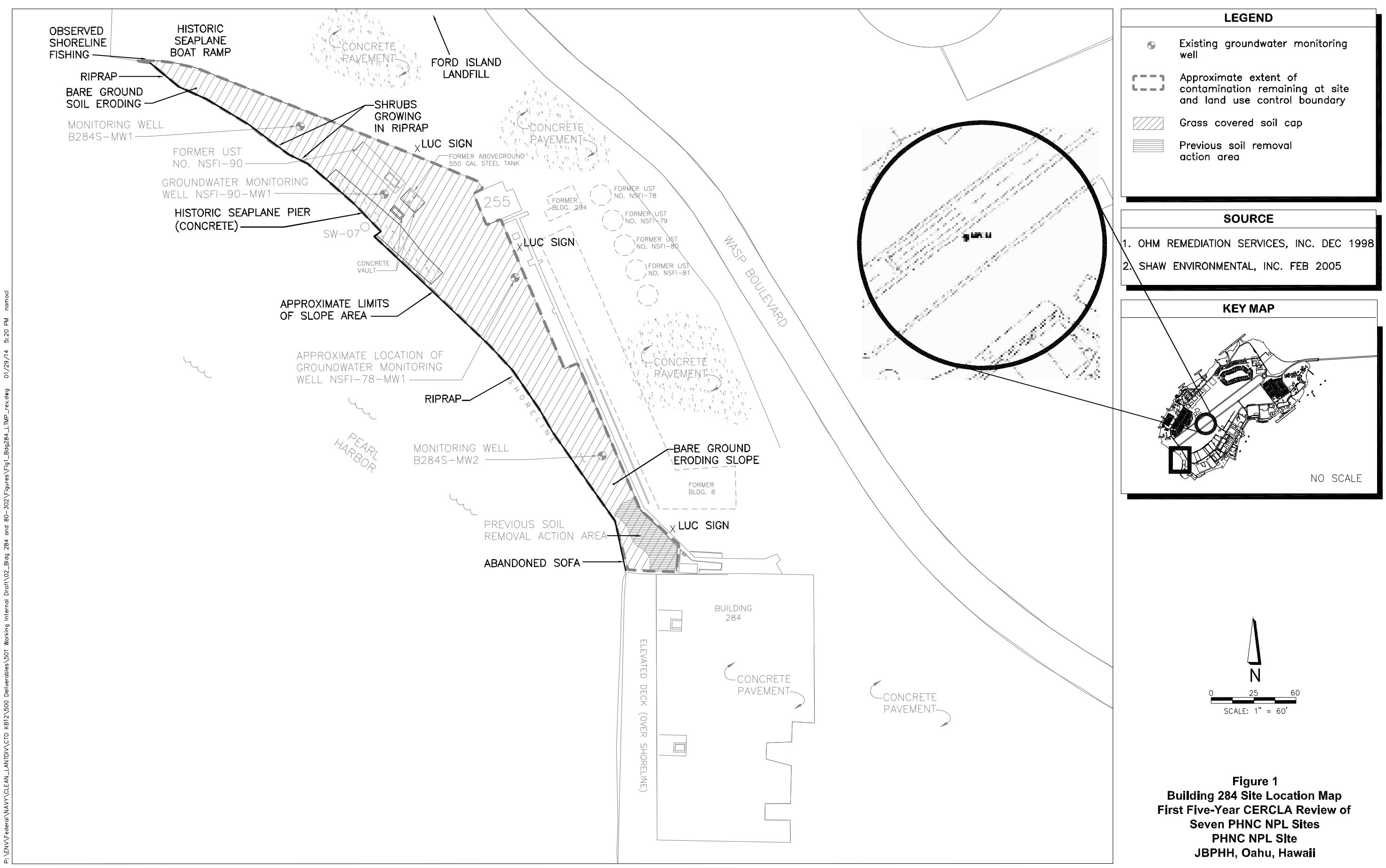
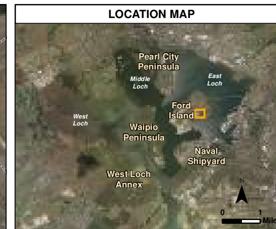


Figure 1
Building 284 Site Location Map
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii



LEGEND

- Approximate Extent of Contamination Remaining at Site
- Former Building 4
- Coral Gravel Replaced by Asphalt
- Grass Covered Soil Cap
- Land Use Control Boundary

NOTES

1. Map Projection: Hawaii State Plane Zone 3, NAD 83
2. Base Map Orthophoto: Earth Data, USGS Hawaii Data Clearinghouse.

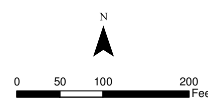


Figure 2
Former Buildings 80 and 302 Site Location Map
First Five-Year CERCLA Review of Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

P:\ENV\Federal\NAVY\CLEAN_LANTDIV\CTO KB12\500 CAD-GIS\02_MXD\Site Location Maps\Fig 2 - Former Bldg 80 & 302 Site Location Map.mxd

3. Remedial Actions

A ROD documenting the final remedy selected to address residual metals concentrations at the Bldg. 284 and Former Bldgs. 80/302 sites was signed in 2009, and specifies LUCs as the final remedy for these sites (DON 2009).

3.1 REMEDIAL ACTION OBJECTIVES

Performance objectives for the final remedy is LUCs to restrict current and future land use to activities and include a vegetative soil cap, rip-rap revetment inspection and maintenance, and groundwater monitoring to ensure long-term viability of the final remedy. Specific remedial action objectives include the following:

- Protect human health and the environment by eliminating exposure pathways to human and ecological receptors
- Protect groundwater quality
- Ensure no unauthorized excavation, uncontrolled soil removal, or construction occurs
- Provide adequate notice of the presence of contaminated soil to users, workers, and any potential landowners
- Ensure that the sites are not used for any purpose that violates the objectives of the LUCs by limiting the development and use of this area to commercial or industrial facilities

3.2 REMEDY DESCRIPTION

The selected final remedy for Bldg. 284 and Former Bldgs. 80/302 includes LUCs consisting of institutional controls, maintenance and inspection of the cap, and five-year reviews. In addition, long-term monitoring of groundwater at Bldg. 284 was included as part of the remedy based on the site's proximity to Pearl Harbor.

Under CERCLA, LUCs are appropriate for sites that have been shown to be safe and suitable for industrial or commercial reuses, but may not be suitable for unrestricted (residential) reuse. Completed RI and risk evaluation efforts have shown the Bldg. 284 Site and the Former Bldgs. 80 and 302 Site to be suitable for commercial/industrial reuse as long as LUCs are implemented. The establishment of LUCs provides the best alternative for eliminating or limiting future exposure pathways.

LUCs. The LUC boundaries for the Bldg. 284 Site and the Former Bldgs. 80 and 302 Site are shown in Figures 1 and 2. LUCs are instituted to ensure the current industrial land use is maintained at the site and to prohibit any unauthorized land modifications. Examples of such land modifications include activities that might disturb the existing vegetative soil caps or existing building structures for the two sites, the rip-rap revetment at the Bldg. 284 Site, and gravel parking areas and asphalt-paved areas at the Former Bldgs. 80 and 302 Site, which could potentially expose contaminated soil at the two sites. If such activities must occur, the Navy would ensure proper handling and disposal of the soil.

Should the property ever be transferred, the LUCs would be maintained through appropriate deed restrictions. Implementation of LUCs would be confirmed by annual inspections to be performed by the Navy or subsequent property owner if the property is ever transferred. In the event that the Navy transfers these LUC responsibilities to another party by contract, property transfer agreement, or through other means, the Navy retains ultimate responsibility for remedy integrity.

LUCs will be maintained at the Bldg. 284 Site and the Former Bldgs. 80 and 302 Site until the concentration of hazardous substances in the soil and groundwater are at such levels as to allow for unrestricted land use and exposure.

Groundwater and Surface Water Sampling. Semiannual groundwater and surface water monitoring will be conducted at the Bldg. 284 Site (starting in 2014). Dissolved metals concentrations in groundwater samples from monitoring wells within the slope area will be compared to the background levels (interwell comparison), intrawell evaluations, and other statistical methods to evaluate trends and determine whether significant changes in site conditions are occurring. The concentrations of dissolved metals in groundwater and surface water will also be compared directly to Hawaii state surface water standards (DOH 2012) to conservatively screen for potential impacts to Pearl Harbor.

3.3 REMEDY IMPLEMENTATION

The LUC work plan (WP) (AECOM 2011) was prepared as a result of the selection of LUCs as a component of the final remedy in accordance with the ROD for the Bldg. 284 and Former Bldgs. 80/302 sites. The LUC WP provided details regarding the overall program objectives, approach, and sampling requirements.

The objectives of the LUC WP were to (1) restrict land use to acceptable activities, and (2) ensure the long-term viability of the final remedy. The LUC WP included the following engineering and institutional controls:

- Asphalt-paved areas and coral gravel parking lots at the Former Bldgs. 80 and 302 Site
- Permeable and vegetative soil cap
- Stone rip-rap revetment along shoreline at the Bldg. 284 Site
- Monitoring of groundwater at the Bldg. 284 Site
- Maintain building structures within LUC boundaries
- Install signage along LUC boundaries
- CERCLA five-year reviews
- Place and monitor the following institutional (legal) controls in the LUC Tracker application in the Naval Installation Restoration Information Solution:
  - Land use restrictions to prohibit development or digging
  - Notice of site contamination and land use restrictions
  - Right of access for purposes of site inspection and further response action, if necessary

The long-term monitoring plan (LTMP) was prepared to describe site inspection and monitoring activities to be performed at the Bldg. 284 Site and Former Bldgs. 80 and 302 Site. The LTMP provides details regarding the approach and requirements for site inspections and groundwater and surface water monitoring. Site inspection and monitoring activities include inspections of permeable vegetated caps and other surface features that are required to ensure protectiveness at both sites and groundwater and surface water monitoring at the Bldg. 284 Site.

3.4 SYSTEMS OPERATIONS AND MAINTENANCE

Except for compliance monitoring, the Bldg. 284 and Former Bldgs. 80/302 sites do not have an active remedial system. According to the remedial project manager (RPM), no significant cost variances indicative of potential problems were identified with regards to the operation and maintenance costs.

4. Progress Since the Last Five-Year Review

This is the first five-year review for the Bldg. 284 and Former Bldgs. 80/302 Sites; consequently, there is no progress to report.

5. Five-Year Review Process

5.1 Administrative Components

The public was notified of the initiation of this five-year review in July 2013. The five-year review team members are listed in Table 5-1.

Table 5-1: Five-Year Review Team Members

DOH	Regulatory Project Manager: Maria Reyes/Wendy Ray
Navy	RPM for five-year review: Jan Kotoshirodo
	RPM for specific site: Jan Kotoshirodo
EPA	Regulatory Project Manager: Christopher Lichens
AECOM	Project Manager: Dean Baxley
	Deputy Project Manager: Teresa Quiniola
	Project Support: Dustin Goto, Andrea VonBurg Hall

AECOM AECOM Technical Services, Inc.

The team members established a review schedule extending from May to December 2013, during which they performed community involvement related to the current five-year review, reviewed relevant documents and data, inspected the site, and interviewed the site project manager and regulators.

5.2 Document Review

This five-year review includes a review of relevant documents including, the ROD, RI, feasibility studies, risk assessments, WPs, remedial designs, completion reports, long-term monitoring and operation reports, LUC inspection reports, monitoring data, and various compliance reports. The list of documents reviewed is provided in Section 9. Applicable groundwater and other cleanup standards, as listed in the ROD, were reviewed. No applicable or relevant and appropriate requirements and to be considered criteria have changed since the ROD.

5.3 Data Review

An Annual LUC Compliance Checklist was reviewed for the Bldg. 284 and Former Bldgs. 80 and 302 sites for the 2012 calendar year. The checklist, completed by the Naval Facilities Engineering Command, Hawaii RPM, noted the sites were in compliance in regards to right-of-access, unauthorized activities that could damage the soil cap, completeness of the vegetative soil cap, and intactness of the pavement and coral gravel, among other criteria. No indication that the coral gravel had been disturbed had been noted.

No other reports, including groundwater monitoring data reports for Bldg. 284, were available for review at the time of this Five-Year Review.

5.4 Site Inspection

A five-year review site inspection at the Bldg. 284 and Former Bldgs. 80 and 302 sites was conducted on 23 July 2013 to assess the operations and effectiveness of LUCs at the site. In addition, a follow-up site inspection was conducted on 12 September 2013 to observe recently installed LUC signage. During the site visits, the weather was sunny and the temperature averaged in the mid 70 degrees Fahrenheit. As observations were made, a five-year review site inspection checklist was completed to document the status of the site (see Attachment A).

No significant issues were identified regarding the LUC areas, except that the bare soil was observed at Bldg. 284 and at former Bldgs. 80 and 302, the coral gravel area was replaced by asphalt paving. Findings of the site inspection are described below.

5.4.1 Bldg. 284 Site Inspection

The Bldg. 284 site is currently unoccupied. The soil cap at the Bldg. 284 site was mostly vegetated with grass. However, bare patches of soil were observed. Areas of dry grass were also present, most likely due to inadequate precipitation. Three LUC signs were installed between the initial site inspection on 23 July 2013 and the follow-up site inspection on 12 September 2013. No evidence of vehicular traffic on the cap was observed. In addition, no evidence of holes, subsidence, or slope instability was observed that may compromise the protectiveness of the cap. The rip-rap revetment bordering the shoreline appeared to be intact. Several small shrubs were growing in the rip-rap to the north of the concrete pier. An abandoned sofa was observed near to the shoreline next to Bldg. 284 indicating unauthorized dumping had occurred. Fishing poles were observed in the water at the northwest end of the site.

5.4.2 Former Bldgs. 80 and 302 Site Inspection

The Former Bldgs. 80 and 302 site is used as a recreational area east of Independence Street and is used by Port Operations west of Independence Street. An area in the southeast corner of the former Bldgs. 80 and 302 site was observed as bare soil due to vehicular traffic. It appeared that vehicles regularly use the area to drive between paved parking areas. Although the location was stripped of vegetative cover, the soil was not significantly disturbed. In general, there was no significant evidence of holes, subsidence, or slope instability observed that may compromise the protectiveness of the vegetative soil cap to the east of Independence Street. Concrete and other small metal debris were observed on the ground surface within the LUC area mostly to the east of the cap. Several cracks are present in the asphalt parking area to the north of the soil cap.

The area directly north of Port Operations, Bldg. 3, was observed to be asphalt-paved, fenced, and used as a parking lot and storage yard for marine-related equipment. However, the LUC WP had identified the area as coral gravel with a small grassed area (AECOM 2011). The replacement of the coral gravel is an indication that ground disturbance may have occurred. There were a few small openings and cracks in the concrete pavement surrounding Bldg. 3 and in the asphalt pavement west of Independence Street; however, the openings were less than 1 square-foot in size.

Photographs from the site visit are presented in Attachment B.

5.5 INTERVIEWS

The following personnel were interviewed:

Name	Affiliation	Date
Maria Reyes	DOH, Regulatory Project Manager	14 November 2013
Christopher Lichens	EPA, Regulatory Project Manager	12 November 2013
Jan Kotoshirodo	NAVFAC Hawaii, RPM	15 November 2013

NAVFAC Naval Facilities Engineering Command

The RPM and regulatory project managers indicated that overall the remedy was functioning well. The DOH regulatory project manager indicated that the vegetative covers for the sites may require some maintenance. Interview forms are presented in Attachment C.

6. Technical Assessment

Answers to the following three key technical questions are presented in tabular format below:

- A: Is the remedy functioning as intended by the decision documents?
- B: Are the assumptions used at the time of remedy selection still valid?
- C: Does any other information call into question the protectiveness of the remedy?

A review of the CSM for the Bldg. 284 and Former Bldgs. 80/302 sites indicated that no significant changes to land use or site conditions were identified that would affect the remedy effectiveness.

SITE: BLDG. 284 AND FORMER BLDGS. 80 AND 302
QUESTION A: Is the remedy functioning as intended by the decision documents?

Element	Assessment
Remedial Action Performance	The final remedy implemented at the Bldg. 284 and Former Bldgs. 80/302 includes LUCs. LUCs are the non-technical and non-engineering actions that mitigate potential risks to human health and the environment by restricting access to contaminated media. LUCs ensure the current industrial land use is maintained at the site and prohibits any unauthorized land modifications that may disturb the vegetative soil cap or existing building structures for the two sites, the rip-rap revetment at Bldg. 284, or gravel parking areas and asphalt-paved areas at the Former Bldgs. 80 and 302.
System Operations/O&M	No active systems are in place; however, the first long-term groundwater monitoring event was performed in February 2014 at the Bldg. 284 Site.
Cost of Systems Operations/O&M	No cost variances that suggest the remedy is not functioning properly were identified.
Opportunities for Optimization	No opportunities for optimization were identified for the Bldg. 284 and Former Bldgs. 80/302 sites.
Early Indicators of Potential Remedy Failure	The remedy is functioning as intended.
Implementation of Institutional Controls and Other Measures	JBPHH is a secure facility, and entry is restricted and vigorously enforced. Administrative processes and procedures require approval for all projects involving construction or digging and subsurface disturbance. These procedures involve coordination and approval by NAVFAC Hawaii environmental personnel for projects located in or near environmental restoration sites, including LUC sites. The Navy will ensure that these or similar processes and procedures remain in place and are followed for all proposed construction, digging, and subsurface soil disturbing activities. When the coral gravel at the site was replaced with asphalt, the necessary coordination with NAVFAC Environmental was conducted.

O&M operation and maintenance

SITE: Building 284 and Former Buildings 80/302
QUESTION B: Are the assumptions used at the time of remedy selection still valid?

Element	Assessment
Changes in Standards and TBC Requirements	Regulatory requirements were considered in the selection of the final remedy. Changes in screening criteria and toxicity are discussed below.
Changes in Exposure Pathways and Land Use	No change in land use has occurred at the Bldg. 284 and Former Bldgs. 80/302 sites which are still used for industrial and recreational purposes. It is anticipated that the sites will continue to be used for industrial and recreational purposes as part of JBPHH.
Changes in Toxicity and Other Contaminant Characteristics	Table 6-1 compares EPA's RSLs (EPA 2013) used in evaluating the original risk estimates with the May 2012 EPA RSLs (EPA 2013) for Bldg. 284. With the exception of arsenic, mercury, and nickel the May 2012 RSLs for each of the COCs are equal to or greater than the previous PRGs (EPA 2013). The MDCs within the LUC area for antimony, arsenic, lead and mercury exceeds the May 2012 RSLs and background concentrations. All other COCs are below screening criteria. The MDC for mercury is only slightly above screening criteria and the current non-cancer risk. However, the risk for antimony, arsenic and lead exceed the acceptable risk range. Therefore, the vegetative soil cap and rip-rap revetment over the sloped area of the Bldg. 284 Site is necessary to prevent potential exposure of humans to unacceptable metals concentrations. Table 6-2 compares EPA's RSLs used in evaluating the original risk estimates with the May 2012 EPA RSLs (EPA 2013). With the exception of arsenic, nickel, and thallium, the May 2012 RSLs for each of the COCs are equal to or greater than the previous PRGs (EPA 2013). The MDCs within the LUC area for antimony, arsenic, cadmium, copper, lead, thallium, and zinc exceeds the May 2012 RSLs and background concentrations. All other COCs are below screening criteria. The MDC for cadmium is only slightly above screening criteria and the current non-cancer risk. However, the risk for antimony, arsenic, copper, lead, thallium, and zinc exceed the acceptable risk range. Therefore, the vegetative soil cap and gravel and asphalt paved areas need to be maintained to prevent potential exposure of humans to unacceptable metals concentrations. Remedial actions include implementation of LUCs and maintenance of vegetative soil covers, revetment, and paved areas which are protective of the industrial worker and recreational user. Therefore, the changes to the RSLs do not affect the RAOs, which limit use of the site to industrial or commercial use. Thus, it is not necessary to update the standards used at the time of remedy selection.
Changes in Risk Assessment Methodologies	Changes in risk assessment methodologies since the time the ROD was prepared include changes in the estimation of risk from exposure to chemicals via inhalation. However, these changes do not call into question the protectiveness of the remedy for the Bldg. 284 and Former Bldgs. 80/302 sites because the LUCs restrict use to industrial/commercial activities and COCs do not pose an inhalation concern. Human health risk at this site has been addressed by capping the areas with clean soil and asphalt.
Remedy Byproducts	No remedy byproducts have been identified to consider in this assessment.
New Contaminants and Contaminant Sources	No new contaminants or contaminant sources have been identified.
Expected Progress Toward Meeting RAOs	No change has occurred in the physical condition of Bldg. 284 that would affect the protectiveness of the remedy. However, during the site visit the coral gravel at former Bldgs. 80 and 302 appears to have been replaced with asphalt. The asphalt still provides a protective cover that limits human exposure to contaminated soil. Exposure assumptions, toxicity data, cleanup levels, and RAOs remain valid for the selected remedy. The RAOs for Bldg. 284 and Former Bldgs. 80/302 sites are still appropriate.

MDC maximum detected concentration
RAO remedial action objective
RSL regional screening level
TBC to be considered

Table 6-1: Bldg. 284 Review of Human Health Toxicity Data Used in Risk Assessment

Detected Analyte	Maximum Detected Concentration (MDC) within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Industrial Noncancer HI [b] Based on Current PRG and MDC	Conclusion
COCs Detected after Removal Action at Building 284											
Antimony	410	31	Yes	31	Noncancer	Yes	7.3	Yes	NA	1.3E+01	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Arsenic [c]	798	22	Yes	0.39	Cancer	Yes	16	Yes	2.0E+03	NA	MDC still exceeds PRG and background; current risk is above acceptable cancer risk range of 1E-04 to 1E-06.
Beryllium	0.002	150	No	160	Noncancer	No	2.5	No	NA	1.3E-05	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Cadmium	33	37	No	70	Noncancer	No	2.3	Yes	NA	4.7E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Copper	676	3,100	No	3,100	Noncancer	No	110	Yes	NA	2.2E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Lead	4,960	400	Yes	400	Noncancer	Yes	29	Yes	NA	1.2E+01	MDC exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Mercury	10.8	23	No	10	Noncancer	Yes	0.29	Yes	NA	1.1E+00	MDC slightly exceeds PRG and background; current noncancer risk is slightly above acceptable noncancer HI.
Nickel	116	1,600	No	1,500	Noncancer	No	205	No	NA	7.7E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Selenium	11	390	No	390	Noncancer	No	9	Yes	NA	2.8E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Detected Analyte	Maximum Detected Concentration (MDC) within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Industrial Noncancer HI [b] Based on Current PRG and MDC	Conclusion
Zinc	12,700	23,000	No	23,000	Noncancer	No	166	Yes	NA	5.5E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Sources: MDCs (DON 2009; Earth Tech 2007b,c), Original PRGs (EPA 2014), Current PRGs (EPA 2013).
HI hazard index
NA not available
[a] Industrial cancer risk is derived using the following equation: (MDC/Current PRG) x (target risk level [10^{-6}]).
[b] Industrial non-cancer HI is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).
[c] Screening criteria is based on DOH risk-based corrective action Tier 1 Soil Action Level.

Table 6-2: Former Bldgs. 80/302 Review of Human Health Toxicity Data Used in Risk Assessment

Detected Analyte	Maximum Detected Concentration (MDC) within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Industrial Cancer Risk [a] or Noncancer HI [b] Based on Current PRG and MDC	Result of further evaluation
COCs Detected after Removal Action East of Independence Street											
Antimony	38.3	31	Yes	31	Noncancer	Yes	7.3	Yes	NA	1.2E+00	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Arsenic	88.5	22	Yes	0.39	Cancer	Yes	16	Yes	2.3E+02	NA	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Cadmium	49.3	37	Yes	70	Noncancer	No	2.3	Yes	NA	7.0E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Chromium	323	210	Yes	120,000	Noncancer	No	250	Yes	NA	2.7E-03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Copper	27,200	3,100	Yes	3,100	Noncancer	Yes	110	Yes	NA	8.8E+00	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Lead	9,600	400	Yes	400	Noncancer	Yes	96	Yes	NA	2.4E+01	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Mercury	2.9	23	No	10	Noncancer	No	0.29	Yes	NA	2.9E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Nickel	787	1,600	No	1,500	Noncancer	No	205	Yes	NA	5.2E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Selenium	17.3	390	No	390	Noncancer	No	9	Yes	NA	4.4E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Detected Analyte	Maximum Detected Concentration (MDC) within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Industrial Cancer Risk [a] or Noncancer HI [b] Based on Current PRG and MDC	Result of further evaluation
Silver	3.7	390	No	390	Noncancer	No	0.86	Yes	NA	9.5E-03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Thallium	3.6	5.2	No	0.78	Noncancer	Yes	2.7	Yes	NA	4.6E+00	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Zinc	14,900	23,000	No	23,000	Noncancer	No	166	Yes	NA	6.5E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
COCs Detected after Removal Action West of Independence Street											
Cadmium	73	37	Yes	70	Noncancer	Yes	2.3	Yes	NA	1.0E+00	Noncancer HI is 1.0, although MDC slightly exceeds PRG.
Copper	12,300	3,100	Yes	3,100	Noncancer	Yes	110	Yes	NA	4.0E+00	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Lead [c]	63,000	400	Yes	400	Noncancer	Yes	96	Yes	NA	1.6E+02	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.
Selenium	63.1	390	No	390	Noncancer	No	9	Yes	NA	1.6E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Zinc	60,900	23,000	Yes	23,000	Noncancer	Yes	166	Yes	NA	2.6E+00	MDC still exceeds PRG and background; current noncancer risk is above acceptable noncancer HI.

Sources: MDCs (DON 2009 and Earth Tech 2007), Original PRGs (EPA 2013), Current PRGs (EPA 2013).
NA not available
[a] Industrial cancer risk is derived using the following equation: (MDC/Current PRG) x (target risk level [10^{-6}]).
[b] Industrial non-cancer HI is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).
[c] Screening criteria is based on DOH risk-based corrective action Tier 1 Soil Action Level.

SITE: Building 284 and Former Buildings 80/302 **QUESTION C: Does any other information call into question the protectiveness of the remedy?**	
Element	**Assessment**
Overall	No information that would call into question the protectiveness of the remedy has been identified.

7. Issues, Recommendations, and Follow-up Actions

Issues identified during the site inspection and interviews are listed in Table 7-1.

Table 7-1: Issues and Recommendations for the Bldg. 284 and Former Bldgs. 80/302 Site

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Affects Protectiveness? (Y/N)	
				Current	Future
The coral gravel cover described in the ROD and RAWP appears to have been replaced by asphalt.	The NAVFAC RPM indicated that the work done to replace the coral gravel was done with the proper notifications and no soil 6 inches below ground surface was disturbed. However, the LUC work plan and annual inspection forms need to be updated to indicate that the asphalt cover has replaced the coral gravel and will need to be verified and inspected.	Navy	EPA/DOH	N	Y
The long-term monitoring plan was finalized in July 2013 (AECOM 2013), and the first sampling event was completed in February 2014; Therefore, the results were not available for review.	During the next five-year review, groundwater sampling results from Bldg. 284 should be evaluated.	Navy	EPA/DOH	N	Y
Exposed soil and dry grass may eventually compromise the integrity of the soil caps.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Navy	EPA/DOH	N	Y
Vegetation growing in rip-rap at the Bldg. 284 site may affect the protectiveness of the shoreline.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Navy	EPA/DOH	N	Y
Minor cracks and holes in pavement at the Former Bldgs. 80/302 site.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Navy	EPA/DOH	N	Y
Fishing and rubbish were observed at the shoreline for Bldg. 284.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Navy	EPA/DOH	N	Y

8. Protectiveness Statement

The remedy at Bldg. 284 and Former Bldgs. 80/302, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.

No changes in land use are expected in the foreseeable future.

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First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Building 284 and Former Buildings 80/302

Attachment A: Five-Year Review Site Inspection Checklist

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. "N/A" refers to "not applicable."

I. SITE INFORMATION	
Site Name: Former Buildings 80/302	**Date of Inspection:** July 23, 2013
Location and Region: Honolulu, HI	**EPA ID:** HI4170090076
Agency, office or company leading the five-year review: NAVFAC Hawaii /AECOM	**Weather/temperature:** Sunny, mid 70s °F
Remedy Includes: (Check all that apply) ☒ Landfill cover/containment ☐ Access controls ☒ Institutional controls ☐ Groundwater pump and treatment ☐ Surface water collection and treatment ☒ Other – LTMM and LUCs	
Attachments: ☐ Inspection team roster attached Inspection Team Members: Dustin Goto (AECOM) Teresa Quiniola (AECOM)	☐ Site map attached

II. INTERVIEWS (Check all that apply)

1.	**O&M Site Manager**	☒ N/A
2.	**O&M Staff**	☒ N/A

3. Local regulatory authorities and response agencies (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency Hawaii Department of Health

Contact	Name	Title here	Date	Phone Number
	Maria Reyes	Remedial Project Mgr.	November 14, 2013	808-586-4653

Agency EPA Region 9

Contact	Name	Title here	Date	Phone Number
	Christopher Lichens	Remedial Project Mgr.	November 12, 2013	415-972-3149

Problems, suggestions: ☒ Report attached (Refer to Attachment C)
Remarks:

4. Other interviews (optional) ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Jan Kotoshirodo, NAVFAC RPM

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents ☐ Readily available ☐ Up to date ☐ N/A
Remarks: No annual inspections for 2010 and 2011 were conducted.

III. ONSITE DOCUMENTS & RECORDS VERIFIED (continued)			
2. Site-Specific Health and Safety Plan	☒ Readily available	☒ Up to date	☐ N/A
3. O&M and OSHA Training Records	☐ Readily available	☐ Up to date	☒ N/A
4. Permits and Service Agreements	☐ Readily available	☐ Up to date	☒ N/A
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
7. Groundwater Monitoring Records	☐ Readily available	☐ Up to date	☒ N/A
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records	☐ Readily available	☐ Up to date	☒ N/A
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A

IV. O&M COSTS

1. O&M Organization

☐ N/A ☐ Contractor for State
☒ Other: PRP ☐ Contractor for PRP

2. O&M Cost Records

☐ Readily available ☐ Up to date
☒ Funding mechanism/agreement in place
Original O&M cost estimate N/A ☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☒ Location shown on map ☐ Gates secure ☐ N/A

Remarks: Fencing is present around the LUC area to the north of Bldg. 3. Entry into the area is secured through locked gates.

B. Other Access Restrictions

1. Signs and other security measures ☐ Signs ☒ N/A

Remarks: "No digging" or other LUC signs prohibiting ground disturbance are not present in or around the Former Bldgs. 80/302 LUC area.

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	☒ No	☐ N/A
Site conditions imply ICs not being fully enforced	☒ Yes	☐ No	☐ N/A

Remarks: Grass on and around the soil cap is dry. An area in the southeast corner of the LUC area is bare due to usage as a shortcut into a parking lot by vehicles. LUC inspections for 2010 and 2011 were not conducted.

Type of monitoring (e.g., self-reporting, drive by): LUC inspections

Frequency: Annual (However, the inspections for 2010 and 2011 were not conducted.)

Responsible party/agency NAVFAC Hawaii

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

Contact

Name	Title	Date	Phone No.
Jan Kotoshirodo	RPM	11/15/2013	808-471-1171 x341

Reporting is up-to-date ☐ Yes ☒ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: Patches of bare soil and dry vegetation along the soil cap were observed during the site inspection. There are several cracks in the pavement around Bldg. 3. The cracks do not compromise the overall protectiveness of the pavement, and are not the result of ground disturbance or other construction activities.

2. Adequacy ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
Remarks: LUC inspections should be documented on an annual basis. It appears that coral gravel in place at the time of the ROD has been replaced by asphalt.

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

2. Land use changes on site ☒ Applicable ☐ N/A
Remarks: Bldg. 3 and its storage yard to the north was being used by Port Operations. The storage yard contains a variety of marine equipment and other miscellaneous equipment and supplies.

3. Land use changes off site ☒ Applicable ☐ N/A
Remarks: A Child Development Center is located to the north of the site across Lexington Blvd. A hazardous materials storage is present just outside of the LUC area to the northwest

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A
Remarks: Although roadway and parking lot pavement has minor cracks, the pavement is in fair to good condition. No evidence of significant digging or other intrusive activities were observed, except for the replacement of the coral gravel with asphalt. The area immediately north of Bldg. 3, which was previously identified as coral gravel in the LUCWP (DON 2011) was paved at the time of the site visit.

B. Other Site Conditions ☒ Applicable ☐ N/A
Remarks: Grass is dry over and around the soil cap. Furthermore, small metal and concrete debris are also intermittently found mostly to the east and northwest of the soil cap within the LUC area.

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. Settlement (Low spots) ☐ Location shown on site map ☒ Settlement not evident

VII. LANDFILL COVERS (cont'd)			
2. Cracks		☐ Location shown on site map	☒ Cracking not evident
3. Erosion		☐ Location shown on site map	☒ Erosion not evident
4. Holes		☐ Location shown on site map	☒ Holes not evident
5. Vegetative Cover ☒ Grass ☐ Cover properly established ☐ No signs of stress ☒ Trees/Shrubs Remarks: Grass covers most of the area on and around the soil cap. Most of the grass is dry likely due to a lack of precipitation. Trees line the perimeter of the grass area.			
6. Alternative Cover (armored rock, concrete, etc.)		☒ N/A	
7. Bulges		☐ Location shown on site map	☒ Bulges not evident
8. Wet Areas/Water Damage		☒ Wet areas/water damage not evident	
9. Slope Instability	☐ Slides	☐ Location shown on site map	☒ No evidence of slope instability
B. Benches		☐ Applicable	☒ N/A
C. Letdown Channels		☐ Applicable	☒ N/A
D. Cover Penetrations		☐ Applicable	☒ N/A
E. Gas Collection and Treatment		☐ Applicable	☒ N/A
F. Cover Drainage Layer		☐ Applicable	☒ N/A
G. Detention/Sedimentation Ponds		☐ Applicable	☒ N/A
H. Retaining Walls		☐ Applicable	☒ N/A
I. Perimeter Ditches/Off-Site Discharge		☐ Applicable	☒ N/A

VIII. VERTICAL BARRIER WALLS	☐ Applicable	☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES	☐ Applicable	☒ N/A

X. OTHER REMEDIES
The long-term maintenance and monitoring at the site includes soil cover maintenance and annual inspections.

XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy
The remedial action objectives consist of LUCs and monitoring to minimize potential exposure to contaminated soil. Observations suggest that the remedy is functioning as intended. Furthermore, several small holes in the concrete and asphalt pavement around the site were noted. The area immediately to the north of Bldg. 3, which was previously specified as coral gravel in the LUCWP (DON 2011) appears to have been paved with asphalt.
B. Adequacy of O&M
Annual inspections (except for 2012) were not conducted.
C. Early Indicators of Potential Remedy Failure
Bare areas and dry vegetation in the soil cap were observed during the site inspection.
D. Opportunities for Optimization
The soil cap should be regularly irrigated to promote vegetative growth, which will help to stabilize soil.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. "N/A" refers to "not applicable."

I. SITE INFORMATION

Site Name: Former Buildings 80/302	**Date of Inspection:** July 23, 2013
Location and Region: Honolulu, HI	**EPA ID:** HI4170090076
Agency, office or company leading the five-year review: NAVFAC Hawaii /AECOM	**Weather/temperature:** Sunny, mid 70s °F

Remedy Includes: (Check all that apply)
☒ Landfill cover/containment
☐ Access controls
☒ Institutional controls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
☒ Other – LTMM and LUCs

Attachments: ☐ Inspection team roster attached
Inspection Team Members:
Dustin Goto (AECOM)
Teresa Quiniola (AECOM)
☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** ☒ N/A
2. **O&M Staff** ☒ N/A

3. **Local regulatory authorities and response agencies** (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency Hawaii Department of Health

Contact	Name	Title here	Date	Phone Number
	Maria Reyes	Remedial Project Mgr.	November 14, 2013	808-586-4653

Agency EPA Region 9

Contact	Name	Title here	Date	Phone Number
	Christopher Lichens	Remedial Project Mgr.	November 12, 2013	415-972-3149

Problems, suggestions: ☒ Report attached (Refer to Attachment C)
Remarks:

4. **Other interviews** (optional) ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Jan Kotoshirodo, NAVFAC RPM

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents** ☐ Readily available ☐ Up to date ☐ N/A
Remarks: No annual inspections for 2010 and 2011 were conducted.

III. ONSITE DOCUMENTS & RECORDS VERIFIED (continued)			
2. Site-Specific Health and Safety Plan	☒ Readily available	☒ Up to date	☐ N/A
3. O&M and OSHA Training Records	☐ Readily available	☐ Up to date	☒ N/A
4. Permits and Service Agreements	☐ Readily available	☐ Up to date	☒ N/A
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
7. Groundwater Monitoring Records	☐ Readily available	☐ Up to date	☒ N/A
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records	☐ Readily available	☐ Up to date	☒ N/A
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A

IV. O&M COSTS

1. O&M Organization

☐ N/A ☐ Contractor for State
☒ Other: PRP ☐ Contractor for PRP

2. O&M Cost Records

☐ Readily available ☐ Up to date
☒ Funding mechanism/agreement in place
Original O&M cost estimate N/A ☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☒ Location shown on map ☐ Gates secure ☐ N/A

Remarks: Fencing is present around the LUC area to the north of Bldg. 3. Entry into the area is secured through locked gates.

B. Other Access Restrictions

1. Signs and other security measures ☐ Signs ☒ N/A

Remarks: "No digging" or other LUC signs prohibiting ground disturbance are not present in or around the Former Bldgs. 80/302 LUC area.

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☒ Yes ☐ No ☐ N/A

Remarks: Grass on and around the soil cap is dry. An area in the southeast corner of the LUC area is bare due to usage as a shortcut into a parking lot by vehicles. LUC inspections for 2010 and 2011 were not conducted.

Type of monitoring (e.g., self-reporting, drive by): LUC inspections

Frequency: Annual (However, the inspections for 2010 and 2011 were not conducted.)

Responsible party/agency NAVFAC Hawaii

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

Contact

Name	Title	Date	Phone No.
Jan Kotoshirodo	RPM	11/15/2013	808-471-1171 x341

Reporting is up-to-date ☐ Yes ☒ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: Patches of bare soil and dry vegetation along the soil cap were observed during the site inspection. There are several cracks in the pavement around Bldg. 3. The cracks do not compromise the overall protectiveness of the pavement, and are not the result of ground disturbance or other construction activities.

2. Adequacy ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
Remarks: LUC inspections should be documented on an annual basis. It appears that coral gravel in place at the time of the ROD has been replaced by asphalt.

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

2. Land use changes on site ☒ Applicable ☐ N/A
Remarks: Bldg. 3 and its storage yard to the north was being used by Port Operations. The storage yard contains a variety of marine equipment and other miscellaneous equipment and supplies.

3. Land use changes off site ☒ Applicable ☐ N/A
Remarks: A Child Development Center is located to the north of the site across Lexington Blvd. A hazardous materials storage is present just outside of the LUC area to the northwest

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A
Remarks: Although roadway and parking lot pavement has minor cracks, the pavement is in fair to good condition. No evidence of significant digging or other intrusive activities were observed, except for the replacement of the coral gravel with asphalt. The area immediately north of Bldg. 3, which was previously identified as coral gravel in the LUCWP (DON 2011) was paved at the time of the site visit.

B. Other Site Conditions ☒ Applicable ☐ N/A
Remarks: Grass is dry over and around the soil cap. Furthermore, small metal and concrete debris are also intermittently found mostly to the east and northwest of the soil cap within the LUC area.

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. Settlement (Low spots) ☐ Location shown on site map ☒ Settlement not evident

VII. LANDFILL COVERS (cont'd)		
2. Cracks	☐ Location shown on site map	☒ Cracking not evident
3. Erosion	☐ Location shown on site map	☒ Erosion not evident
4. Holes	☐ Location shown on site map	☒ Holes not evident
5. Vegetative Cover ☒ Grass ☐ Cover properly established ☐ No signs of stress ☒ Trees/Shrubs Remarks: Grass covers most of the area on and around the soil cap. Most of the grass is dry likely due to a lack of precipitation. Trees line the perimeter of the grass area.		
6. Alternative Cover (armored rock, concrete, etc.)	☒ N/A	
7. Bulges	☐ Location shown on site map	☒ Bulges not evident
8. Wet Areas/Water Damage	☒ Wet areas/water damage not evident	
9. Slope Instability ☐ Slides	☐ Location shown on site map	☒ No evidence of slope instability
B. Benches	☐ Applicable	☒ N/A
C. Letdown Channels	☐ Applicable	☒ N/A
D. Cover Penetrations	☐ Applicable	☒ N/A
E. Gas Collection and Treatment	☐ Applicable	☒ N/A
F. Cover Drainage Layer	☐ Applicable	☒ N/A
G. Detention/Sedimentation Ponds	☐ Applicable	☒ N/A
H. Retaining Walls	☐ Applicable	☒ N/A
I. Perimeter Ditches/Off-Site Discharge	☐ Applicable	☒ N/A

VIII. VERTICAL BARRIER WALLS	☐ Applicable	☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES	☐ Applicable	☒ N/A

X. OTHER REMEDIES
The long-term maintenance and monitoring at the site includes soil cover maintenance and annual inspections.

XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy
The remedial action objectives consist of LUCs and monitoring to minimize potential exposure to contaminated soil. Observations suggest that the remedy is functioning as intended. Furthermore, several small holes in the concrete and asphalt pavement around the site were noted. The area immediately to the north of Bldg. 3, which was previously specified as coral gravel in the LUCWP (DON 2011) appears to have been paved with asphalt.
B. Adequacy of O&M
Annual inspections (except for 2012) were not conducted.
C. Early Indicators of Potential Remedy Failure
Bare areas and dry vegetation in the soil cap were observed during the site inspection.
D. Opportunities for Optimization
The soil cap should be regularly irrigated to promote vegetative growth, which will help to stabilize soil.

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Building 284 and Former Buildings 80/302

Attachment B: Site Photographs

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

Photograph No. 1: Overview of Bldg. 284 site, looking southeast. Dry grass and bare soil in foreground.

Photograph No. 2: Vegetation growing in rip-rap bordering shoreline at Bldg. 284 site.

Photograph No. 3: Abandoned furniture on south end of Bldg. 284 site.

Photograph No. 4: Unauthorized fishing occurring immediately north of Bldg. 284 LUC area.

Photograph No. 5: One of three LUC signs installed at the Bldg. 284 site.

Photograph No. 6: Overview of soil cap and dry grass at former Bldgs. 80/302, looking east.

Photograph No. 7: Side-slope of soil cap at former Bldgs. 80/302, looking west.

Photograph No. 8: Exposed metal and concrete debris around soil cap at former Bldgs. 80/302.

Photograph No. 9: Unpaved road and bare soil within LUC area to east of soil cap at former Bldgs. 80/302.

Photograph No. 10: Cracks in paved parking lot north of soil cap at former Bldgs. 80/302.

Photograph No. 11: Overview of paved LUC area south of Bldg. 3, looking west.

Photograph No. 12: Hole in asphalt pavement to south of Bldg. 3.

Photograph No. 13: View of area to south of Bldg. 3, looking east. Abandoned monitoring well in foreground.

Photograph No. 14: Fenced area storage yard north of Bldg. 3. Area previously identified as being covered with coral gravel was observed with asphalt paving.

Photograph No. 15: Fencing surrounding the LUC area, looking east.

Photograph No. 16: Various supplies stored within the LUC area north of Bldg. 3.

First Five-Year CERCLA Review
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Ford Island Landfill

Building 284 and Former Buildings 80/302

Attachment C: Interview Forms

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

INTERVIEW RECORD

Site Name: Bldg. 284 and Former Bldgs. 80/302 **DOH RPM:** Maria Reyes	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 0912**	**Date: 11/14/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Maria Reyes	**Title:** Regulatory Project Manager	**Organization:** DOH-HEER
Telephone No.: 808-586-4249 **Fax No.:** — **E-Mail Address:** maria.reyes@doh.hawaii.gov	**Street Address:** 919 Ala Moana Boulevard, Rm 206 **City, State, Zip:** Honolulu, Hawaii 96814	

Summary of Conversation

1. How long have you been familiar with the project site?
   Since the middle of 2008.
2. What is your overall impression of the project?
   They did a good job delineating where the contamination was, and they did excavation and a cover. They consolidated the remaining vegetation and they have a cap over it.
3. Is the remedy functioning as expected? How well is the remedy performing?
   I think the only issue is maybe the vegetative cap isn't as maintained as it needs to be; the grass wasn't mowed as often as needed.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No, none of those. DOH doesn't visit routinely; we only visit with the EPA when they schedule a visit.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   Not sure about the sampling. I know there is an LTMP in place.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   Maintenance of the vegetative cap.

INTERVIEW RECORD

Site Name: Bldg. 284 and Former Bldgs. 80/302 **EPA RPM:** Christopher Lichens	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1005**	**Date: 11/12/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Christopher Lichens	**Title:** Regulatory Project Manager	**Organization:** EPA
Telephone No.: 415-972-3149 **Fax No.:** **E-Mail Address:** lichens.christopher@ epa.gov	**Street Address:** 75 Hawthorne Street **City, State, Zip:** San Francisco, CA 94105	

Summary of Conversation

1. How long have you been familiar with the project site?
   About 4 years.
2. What is your overall impression of the project?
   I think it's going according to plan; it's all pretty straightforward.
3. Is the remedy functioning as expected? How well is the remedy performing?
   As far as I know.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   No.

INTERVIEW RECORD

Site Name: Bldg. 284 and Former Bldgs. 80/302 **Navy RPM:** Jan Kotoshirodo	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1008**	**Date: 11/15/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Jan Kotoshirodo	**Title:** Navy Project Manager	**Organization:** Navy
Telephone No.: 808-471-1171 ext. 341 **Fax No.:** — **E-Mail Address:** jan.kotoshirodo@navy.mil	**Street Address:** 400 Marshall Road **City, State, Zip:** JBPHH, HI 96860-3139	

Summary of Conversation

1. How long have you been familiar with the project site?
   As RPM since summer 2006, and I also had that site between March 2002-summer 2004.
2. What is your overall impression of the project?
   I think we've implemented the remedy and not much else is going on yet. I think it's running OK.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities, including LUC inspections.
   Not yet. The first long-term monitoring event will probably be early next calendar year. We are planning on semi-annual long-term monitoring events.
6. Have there been unexpected costs or difficulties at the site in the last five years (or since the ROD was signed? Please provide details.
   No.
7. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.
8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   No.
9. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   The LTMP was sent out for optimization review and there were no significant changes.
10. Do you have any comments, suggestions, or recommendations regarding the project?
    No.

First Five-Year CERCLA Review
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Various Transformer Sites

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Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

CONTENTS

Various Transformer Sites

TABLES

ACRONYMS AND ABBREVIATIONS

§	section
AM	action memorandum
bcy	bank cubic yard
Bldg.	building
CFR	Code of Federal Regulations
DOH	Department of Health, State of Hawaii
DON	Department of the Navy, United States
EPA	Environmental Protection Agency, United States
LUC	land use control
JBPHH	Joint Base Pearl Harbor-Hickam
lcy	loose cubic yard
MDC	maximum detected concentration
mg/kg	milligram per kilogram
mgd	million gallons per day
msl	mean sea level
NAS	Naval Air Station
NCTAMS PAC	Naval Computer and Telecommunications Area Master Station Pacific
NPL	National Priorities List
NTCRA	non-time critical removal action
O&M	operation and maintenance
PCB	polychlorinated biphenyl
PHNC	Pearl Harbor Naval Complex
PRG	preliminary remediation goal
PWC	Public Works Center
RAB	Restoration Advisory Board
RAWP	remedial action work plan
RAO	remedial action objective
RI	remedial investigation
RME	reasonable maximum exposure
ROD	record of decision
RPM	remedial project manager
SAL	soil action level
TSCA	Toxic Substances Control Act (1976) (15 U.S.C. s/s 2601 et seq.)
U.S.	United States

1. Site Chronology

The Various Transformer Sites (Site TD-10, Site K-14, and Site W-4/W-5) are land use control (LUC) sites in the Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) sites at Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii. Significant events relevant to this site are presented in Table 1-1, Table 1-2, and Table 1-3, respectively.

Table 1-1: Transformer Site TD-10 Chronology of Events

Event	Date of Event
An initial assessment study conducted by Naval Energy and Environmental Support Activity in 1983 evaluated 30 potentially contaminated sites at the PHNC, including Transformer TD-10 (NEESA 1983).	1983
A site inspection identified polychlorinated biphenyl (PCB)-contaminated soil at nine transformer locations, including TD-10 (ERC Environmental and Energy Services Company 1991; PWC 1991).	1991
An engineering evaluation/cost analysis (EE/CA) was prepared for various transformer substations at the PHNC. The EE/CA recommended excavation of PCB-contaminated soil at transformer site TD-10 (Ogden 1996).	1996
An action memorandum documented the Navy's decision to undertake a removal action at transformer site TD-10 (DON 2000).	2000
A non-time critical removal action was conducted to remove PCB-contaminated soil from the site and approximately 203 cubic yards of soil was excavated. Post-excavation confirmation sampling results indicated that PCBs remained in the soil and concrete at concentrations above Toxic Substances Control Act high-occupancy cleanup levels and State of Hawaii Department of Health Tier 1 soil action levels for unrestricted use (Earth Tech 2006b, ECC 2007).	2000-2001
Four cycles of concrete washing were performed at TD-10. Verification results for concrete wipe samples showed one sample result exceeding the cleanup level (10 micrograms per 100 centimeters square [µg/100cm^2]) (DON 2010).	2001
One drainage structure at TD-10 was cleaned and sampled. PCB concentrations did not exceed the cleanup levels for soil and concrete (≤1 milligram per kilogram [mg/kg] and ≤10 µg/100cm^2); therefore, no further action was recommended.	2002
A bulk concrete sampling event was conducted at TD-10; samples from two locations had results that exceeded the cleanup level of 1 mg/kg (bulk concrete).	2003
Concrete area at TD-10 was double-painted with epoxy encapsulant on 15 December 2004 (DON 2010).	2004
A record of decision for Three Transformer Sites (TD-10, K-14, and W-4/W-5) was completed, with LUCs approved as the final remedy for the site (DON 2010).	2010
A remedial action work plan was prepared to identify and describe methods and procedures for implementation and maintenance of the required LUCs, including the encapsulation of the concrete was done in 2004 (AECOM 2011).	2011

Table 1-2: Transformer Site K-14 Chronology of Events

Event	Date of Event
An initial assessment study conducted by Naval Energy and Environmental Support Activity in 1983 evaluated 30 potentially contaminated sites at the PHNC, including Transformer K-14 (NEESA 1983).	1983
A site inspection report, field sampling plan, quality assurance project plan, and health and safety plan were prepared for transformer sites located at Halawa-Main Gate Geographic Study Area (GSA) and Waipio Peninsula GSA. Further evaluation was recommended for Transformer K-14 (Earth Tech 2001b).	2001
A site inspection of transformer sites was conducted at Halawa-Main Gate GSA. Sampling results were used to classify each site for further evaluation or for "no further action." Transformer site K-14 was again identified for further evaluation (Earth Tech 2003a).	2001
An attachment to a previously completed action memorandum addendum (DON 2002) recommended a non-time critical removal action for additional sites, including K-14 at Halawa-Main Gate. The non-time critical removal action recommended excavation, followed by on-island thermal desorption treatment of the excavated soils (DON 2003).	2003
Preliminary sampling was conducted to support the design efforts for removal action at various transformer locations including transformer site K-14 (Earth Tech 2001a, 2003b).	2003

Event	Date of Event
Two non-time critical removal actions were conducted at transformer site K-14. Overexcavation was conducted when the initial post-excavation confirmation sampling results were above the cleanup levels. In total, 59.2 bank cubic yards of soil was excavated and 77 loose cubic yards treated (including overexcavated volume). Post-excavation confirmation sampling results indicated that polychlorinated biphenyls remained in the soil at concentrations above Toxic Substances Control Act high occupancy cleanup levels and the State of Hawaii Department of Health Tier 1 soil action levels for unrestricted use (Earth Tech 2006b, ECC 2007).	2004
The excavated area at K-14 was backfilled with treated soil. The asphalt pavement at the site was restored on 10 December 2004 (DON 2010).	2004
A record of decision for Three Transformer Sites (TD-10, K-14, and W-4/W-5) was completed with LUCs approved as the final remedy (DON 2010).	2010
A remedial action work plan was prepared to identify and describe methods and procedures for implementation and maintenance of the required LUCs, including the prevention of disturbance of soil at the site (AECOM 2011).	2011

Table 1-3: Transformer Site W-4/W-5 Chronology of Events

Event	Date of Event
An initial assessment study conducted by Naval Energy and Environmental Support Activity in 1983 evaluated 30 potentially contaminated sites at PHNC, including Transformer W-4/W-5 (NEESA 1983).	1983
A site inspection report, field sampling plan, quality assurance project plan, and health and safety plan were prepared for transformer sites located at Halawa-Main Gate Geographic Study Area (GSA) and Waipio Peninsula GSA. Further evaluation was recommended for transformer site W-4/W-5 (Earth Tech 2001b).	2001
An attachment to a previously completed action memorandum addendum (DON 2002) recommended a non-time critical removal action for additional sites, including W-4/W-5 at Waipio Peninsula. The non-time critical removal action recommended excavation, followed by on-island thermal desorption treatment of the excavated soils (DON 2003).	2003
Preliminary sampling was conducted to support the design efforts for the removal action at various transformer locations including transformer site W-4/W-5 (Earth Tech 2001a, 2003b).	2003
Two non-time critical removal actions were conducted for transformer site W-4/W-5. Overexcavation was conducted when the initial post-excavation confirmation sampling results were above the cleanup levels. In total, 18.4 bank cubic yards of soil was excavated and 23.9 loose cubic yards treated (including overexcavated volume). Post-excavation confirmation sampling results indicated that PCBs remained in the soil and concrete at concentrations above Toxic Substances Control Act high occupancy cleanup levels and the State of Hawaii Department of Health Tier 1 soil action levels for unrestricted use (Earth Tech 2006b, ECC 2007).	2004
The excavated area at W-4/W-5 was backfilled with treated soil and completed with coarse gravel (DON 2010).	2004
A record of decision for Three Transformer Sites (TD-10, K-14, and W-4/W-5) was completed with LUCs approved as the final remedy (DON 2010).	2010
A remedial action work plan was prepared to identify and describe methods and procedures for implementation and maintenance of the required LUCs, including fencing and signage (AECOM 2011).	2011

2. Background

2.1 SITE DESCRIPTIONS

The various transformer sites (TD-10, K-14, and W-4/W-5) are located at JBPHH. The sites are part of the PHNC NPL sites under the United States (U.S.) Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act Information System Site Number HI4170090076.

TD-10 is located inside Building (Bldg.) S181, near the intersection of Yorktown Boulevard and Wasp Boulevard, within JBPHH, Ford Island (Figure 1). The transformer is now inactive. Bldg. S181 is located approximately 500 feet from the northwest shoreline of Ford Island. The site encompasses the concrete slab surrounding the transformer.

K-14 is an active transformer located inside Bldg. S485, south of Kuahua Avenue and adjacent to Bldg. 445, approximately 150 feet from Magazine Loch, within JBPHH, Halawa-Main Gate (Figure 2). The site includes Bldg. S485 and the surrounding asphalt with underlying gravel and soil.

Site W-4/W-5 is located within JBPHH, Waipio Peninsula off Waipio Point Access Road, and includes two active outdoor pad-mounted transformers, W-4 and W-5, which are collocated and considered a single site (Figure 3). The site is located approximately 100 feet from Middle Loch, and includes an outdoor concrete pad (surrounded by a chain-link fence), the surrounding soil and gravel, and a concrete sidewalk on one side.

Previous investigations concluded that polychlorinated biphenyls (PCBs) detected in soil and concrete at the three transformer sites could pose unacceptable risks to human health and the environment, and that response actions were therefore warranted for the sites.

2.2 PHYSICAL CHARACTERISTICS

2.2.1 Topography

Transformer TD-10 is located within a building at an estimated elevation of 12 feet above mean sea level (msl). The LUC area is concrete-paved with an epoxy coating.

Transformer K-14 is located on relatively flat ground at an estimated elevation of 3 feet above msl. The LUC area is paved with asphalt and slightly graded toward a drain located approximately 10 feet to the west.

Transformer W-4/W-5 is located on relatively flat ground at an estimated elevation of 3 feet above msl. With the exception of the existing concrete transformer pads, the LUC area is unpaved and covered with gravel.

2.2.2 Geology and Soils

Transformer TD-10 is located at Ford Island, which lies within the Pearl Harbor basin. Ford Island is classified as a coral outcrop by the U.S. Department of Agriculture, Soil Conservation Service (Earth Tech 2001a), and consists primarily of coral and cemented calcareous sands. Honolulu Series Salt Lake Volcanics were later deposited on this coralline base; these volcanic rocks most commonly appear on the surface of Ford Island as a weathered volcanic tuff.

In general, soils on the Coastal Plain surrounding Pearl Harbor, including Ford Island, are derived primarily from the caprock formation. The caprock consists of interbedded terrestrial and marine deposits including alluvium eroded from the Koolau Volcanics and coralline limestone sediments. Low-permeability clay and silty clay units in the caprock form confining layers over a deep artesian aquifer in the underlying fractured Koolau basalts (Earth Tech 2006a).

Because of past development and land reclamation efforts, significant portions of Ford Island are composed of fill material, consisting of mixtures of gravels, sands, silts, and clays. The fill material consists primarily of on-island derived materials, and the nature of fill deposits varies according to its source, placement method, and its compaction. Fill appears to be generally thickest near the shoreline and thinnest towards the center of the island and where volcanic tuff deposits are observable at the surface (Munro 1981). Changes in the composition, consistency, or placement of the fill material delineate the boundary between fill and in situ material. A significant portion of Ford Island is also covered by concrete and asphalt, which generally overlie fill material.

Transformer K-14 is located at the Halawa-Main Gate area. The underlying geology is similar to Ford Island, consisting of interbedded terrestrial volcanic and marine deposits, including alluvium eroded from the Koolau Volcanics and coralline limestone sediments of the caprock formation. Low-permeability clay and silty clay units in the caprock form confining layers over a deep artesian aquifer in the underlying fractured Koolau basalts (Earth Tech 2006a).

Pearl Harbor soils consist of poorly drained soils on nearly level coastal plains. These soils consist of alluvium derived from basic igneous rocks deposited over organic material, marshy lagoonal muds, and reef limestone/consolidated coral sand. As with Ford Island, much of the land that makes up the Halawa-Main Gate area is fill land. Fill land consists of areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources. This fill land is predominantly composed of packed, but unconsolidated, angular gravel and sand intermixed with varying proportions of silt and clay (Earth Tech 2003b).

Transformer W-4/W-5 is located on Waipio Peninsula, where the underlying geology is typical caprock formation material (interbedded terrestrial and marine deposits including alluvium) described previously. Native coastal plain sediments line the edges of the Waipio Peninsula, with fill material located above the sediments. The fill consists of miscellaneous nonhazardous waste materials from sugar cane cultivation and mill operations and from disposal of soil, household trash, and construction debris (such as wood and scrap metal) (Earth Tech 2003b). Fill material occupies about 40 percent of the Waipio Peninsula area and is likely to be relatively permeable (Earth Tech 2003b).

2.2.3 Groundwater Hydrology

TD-10 is located in the Honolulu–Pearl Harbor basal groundwater aquifer area. The shallow groundwater beneath Ford Island is considered nonpotable and is not hydraulically connected to the deep basal aquifer of Oahu. The shallow Ford Island groundwater is believed to originate from infiltration of precipitation and landscaping irrigation, combined with seawater intrusion. As a result, the shallow groundwater is generally brackish (Earth Tech 2001a).

Groundwater conditions at K-14 and W-4/W-5 are typical of the area surrounding Pearl Harbor, with unconfined caprock groundwater in near-surface sediments that overlie and confine the deep basal aquifer within the fractured basalt bedrock. The caprock is primarily recharged by rainfall and landscaping irrigation, and is likely in direct hydraulic connection with Pearl Harbor. Observed fluctuations in groundwater levels may be caused by seasonal rains and/or tidal influence; the available data are insufficient to make a definite assessment (Ogden 1994, Earth Tech 2006a).

2.3 LAND USE

The future land use of the three transformer sites is anticipated to remain unchanged from current conditions. Transformer site TD-10 was formerly located in an area of commercial and light industrial facilities. However, because of redevelopment and new housing construction, transformer site TD-10 is now located in an area of mixed usage consisting of residential and commercial/light industrial facilities. Land use at transformer site K-14 remains industrial, and the land surrounding transformer site W-4/W-5 remains undeveloped. Transformers at two of the three sites (K-14 and W-4/W-5) are currently active.

2.4 HISTORY OF CONTAMINATION

Table 2-1 provides a summary of the previous investigations completed at the transformer sites, and identifies the sites that were addressed by each investigation or activity.

Table 2-1: Previous Investigations of Transformer Sites TD-10, K-14, and W-4/W-5

Activity Initiated (Report Issue Date)	Action/Report Title	Primary Focus	PHNC LUC ROD Transformer Sites			Summary of Previous Investigations
			TD-10	K-14	W-4/ W-5	
1983 (NEESA 1983)	IAS of Pearl Harbor Naval Base, Oahu, Hawaii	Inspections of sites with past hazardous waste storage operations	X	X	X	An IAS conducted by NEESA in 1983 evaluated 30 potentially contaminated sites at the PHNC. The site assessments were based on evidence of past hazardous waste storage operations and disposal practices. The study concluded that three sites warranted further investigation to assess potential long-term impacts to human health or the environment. Sampling was not included in the IAS (NEESA 1983).
1991 (ERC 1991)	Final SI Report for PCB Transformer Stations, Oahu, Hawaii	Site inspection of 20 transformer locations and identification of sites needing further evaluation	X			An SI was conducted at PHNC in December 1990 to inspect 20 transformer locations. The SI identified PCB-contaminated soil at seven transformer locations that required further evaluation (ERC Environmental and Energy Services Company 1991). PWC later investigated two additional transformer locations in 1991 as part of a separate SI (PWC 1991).
1991 (PWC 1991)	Final SI Report for PCB Transformer Stations, Oahu, Hawaii	Site inspection of two additional transformer locations				
1996 (Ogden 1996)	EE/CA, Pearl Harbor Naval Complex Transformer Sites, Pearl Harbor, Hawaii	Evaluation of alternatives to address PCB contaminated soils at multiple transformer locations	X			In 1996, an EE/CA (Ogden 1996) was prepared for various transformer substations at the PHNC. The EE/CA recommended excavation of PCB-contaminated soil at transformer site TD-10.
2000 (ECC 2007)	NTCRA/Remediation Verification Report Thermal Desorption Treatment of PCB Contaminated Soil, Various Transformer Sites, Oahu, Hawaii	Excavate and stockpile contaminated soil for future treatment	X			A NTCRA was conducted for transformer site TD-10 from November 2000 to September 2001. A total of 203 cubic yards of PCB-containing soil was excavated from the site. The excavated soil was stockpiled at former NAS Barbers Point until it could be transported to the thermal desorption unit for treatment in 2003 and 2004. Post-excavation confirmation sampling results indicated that PCBs remained in the soil and concrete at concentrations above TSCA high-occupancy cleanup levels and the DOH Tier 1 SAL for unrestricted use. The excavated areas were later backfilled with treated soil from the thermal desorption system that met the 1 mg/kg cleanup level, compacted, and restored (such as landscaping, concrete and asphalt paving) (Earth Tech 2006b, ECC 2007).
2000 (Earth Tech 2000)	EE/CA, Treatment/Disposal Alternatives for Contaminated Soil, NCTAMS PAC, Former NAS Barbers Point, and Pearl Harbor Naval Complex, Oahu, Hawaii	Evaluation of treatment alternatives for consolidated contaminated soil from multiple transformer sites	X			In 2000, the Navy, in consultation with the EPA and the DOH, determined that soil from multiple transformer sites at multiple naval facilities across Oahu could be consolidated for treatment, and that this action could be considered an “onsite action.” Based on this decision, treatment alternatives were evaluated in an EE/CA for the combined sites (Earth Tech 2000). The EE/CA recommended consolidating soils from three facilities (former NAS Barbers Point, PHNC, and NCTAMS PAC) and treating the soil with thermal desorption. Prior to implementation of the treatment process, soil that was already excavated was stockpiled at either former NAS Barbers Point or NRTF Lualualei. Once the treatment process began, these stockpiles were transported to the treatment unit located at former NAS Barbers Point.
2000 (DON 2000)	AM, Treatment of Contaminated Media from Multiple Naval Facilities, Oahu, Hawaii	Documentation to approve the removal action at multiple transformer sites	X			An AM (DON 2000) documented the Navy’s decision to undertake removal actions at transformer site TD-10. In addition, the AM documented the Navy’s proposal to excavate PCB-contaminated soil from various locations, consolidate soils from three facilities (former NAS Barbers Point, PHNC, and NCTAMS PAC) and treat the soil with thermal desorption.

Activity Initiated (Report Issue Date)	Action/Report Title	Primary Focus	PHNC LUC ROD Transformer Sites TD-10	K-14	W-4/ W-5	Summary of Previous Investigations
2001 (Earth Tech 2001b)	Site Inspection Report, Field Sampling Plan, Quality Assurance Project Plan and Health and Safety Plan, Various Transformer Sites, Oahu, Hawaii	Site inspection for PCB contamination at transformer sites at the Halawa-Main Gate GSA and Waipio Peninsula GSA		X	X	In 2001, a SI report field sampling plan, quality assurance project plan, and health and safety plan were prepared for transformer sites located at Halawa-Main Gate GSA and Waipio Peninsula GSA. The plans included inspection and environmental sampling guidelines for evaluating the presence or absence of PCB contamination. Transformer sites K-14 and W-4/W-5 were identified for further evaluation based on historical evaluation (Earth Tech 2001b).
2001 (Earth Tech 2003a)	Site Inspection Report, Various Transformer Sites, Oahu, Hawaii	Site inspection for PCB contamination at transformer sites at the Halawa-Main Gate GSA		X		An SI of transformer sites was conducted between November and December 2001 at Halawa-Main Gate GSA. Biased field sampling was conducted to assess the presence or absence of PCBs at each transformer site. Sampling results were used to classify each site for further evaluation or for "no further action." Transformer site K-14 was again identified for further evaluation (Earth Tech 2003a).
2002 (DON 2002)	AM Addendum for Excavation and Treatment of Contaminated Media from Multiple Naval Facilities, Oahu, Hawaii	Documentation of the approved procedures for excavation, treatment, and final placement of contaminated media at sites not covered in the 2000 Action Memorandum	X	X	X	In 2002, an AM addendum (DON 2002) documented procedures for the excavation, treatment, and final placement of soil and concrete from transformer sites not originally considered in the 2000 AM (DON 2000) or any of the previous AMs or EE/CAs prepared for former NAS Barbers Point, PHNC, and NCTAMS PAC. The AM addendum also proposed new criteria at sites to be remediated using excavation, treatment of contaminated soil, solvent extraction or removal of concrete, and final placement of treated materials in an on-island coral pit. (DON 2000). While this AM addendum presented the general criteria for inclusion of a site in the removal action, site-specific information for those sites was to be included as an attachment to the AM addendum, and thereby "plugged in" to the document. This "plug-in" AM addendum would allow the selection of a protective, presumptive cleanup action (excavation, treatment, and placement) for future PCB-contaminated transformer sites, provided that the sites met the selection criteria.
2003 (DON 2003)	AM Attachment II for Excavation and Treatment of Contaminated Media from Multiple Naval Facilities, Oahu, Hawaii	Documentation recommending that new transformer sites undergo removal action		X	X	In March 2003, a "plug-in" attachment to the AM addendum was prepared recommending that additional sites, including K-14 and W-4/W-5, undergo a NTCRA consisting of excavation followed by on-island thermal desorption treatment, and transport and placement of treated media back at the excavation sites (DON 2003).
2003 (Earth Tech 2003b)	Removal Action Design Support and Confirmation Sampling	Preliminary sampling to support design efforts for proposed removal action		X	X	From 2002 to 2004, preliminary sampling was conducted to support the design efforts for the removal action at various transformer locations, including sites K-14 and W-4/W-5. Pre-excavation sampling was conducted to define the lateral and vertical extent of PCB contamination in soils prior to excavation and treatment at former NAS Barbers Point (Earth Tech 2001a, 2003b).
2003 (Earth Tech 2006b and ECC 2007)	NTCRAs Remediation Verification Report Thermal Desorption Treatment of PCB Contaminated Soil, Various Transformer Sites, Oahu, Hawaii	Additional removal of PCB-contaminated soil	X	X	X	Additional NTCRAs were conducted for all three transformer sites (see Table 2-2). Soil from the transformer sites was transported directly to the thermal desorption unit for treatment. Post-excavation confirmation sampling results indicated that PCBs remained in soil and concrete at concentrations above TSCA high occupancy cleanup levels and the DOH Tier 1 SAL for unrestricted use. The excavated areas were backfilled with treated soil from the treatment system that met the 1 mg/kg cleanup level, compacted, and restored (e.g., with landscaping, concrete and asphalt paving) (Earth Tech 2006b, ECC 2007).

AM action memorandum
EE/CA engineering evaluation/cost analysis
GSA Geographic Study Area
IAS initial assessment study
NAS Naval Air Station
NCTAMS PAC Naval Computer and Telecommunications Area Master Station Pacific
NEESA Naval Energy and Environmental Support Activity
NRTF Naval Radio Transmitting Facility
NTCRA non-time critical removal action
PWC Public Works Center
RAWP Remedial Action Work Plan
ROD record of decision
SAL soil action level
TSCA Toxic Substances Control Act

2.5 INITIAL RESPONSE

Non-time critical removal actions (NTCRAs) were implemented at the three transformer sites from 2000 through 2005 to remove soil and concrete containing PCBs with concentrations exceeding the cleanup levels. The NTCRA results indicate that conditions at the three transformer sites pose no unacceptable risk to human health or the environment under the current land use configurations (low-occupancy areas). The contamination exists beneath encapsulated concrete (double-painted with epoxy encapsulant) (site TD-10); beneath a clean, backfilled soil cap and asphalt (site K-14); and beneath a clean, backfilled soil and gravel cap located within a fenced area (site W-4/W-5). A summary of the removal actions at each site is presented in Table 2-2.

Table 2-2: Summary of Removal Actions at Transformer Sites TD-10, K-14, and W-4/W-5

Site	Excavation Dates	Removal Action Summary	Removal Action Final Volume [a]	Soil and Concrete Cleanup Levels	Cleanup Level Results
TD-10	14 Nov 00 – 04 Dec 00; 03 Jan 01 – 24 Jan 01	Two soil excavation events were conducted at this site.	Approximately, 203 cy of soil was excavated.	≤1 mg/kg (soil)	None of the soil verification sampling results exceed the cleanup level (≤1 mg/kg).
	30 May 01; 31 May 01; 23 Jul 01 – 24 Jul 01; 24 Sep 01 – 25 Sep 01	Four cycles of concrete washing were completed. One concrete wipe verification sampling result exceeded the cleanup level. The concrete was double-painted with epoxy encapsulant on 15 December 2004.	N/A	≤10 µg/100 cm^2 (concrete)	One concrete verification wipe sample result exceeded the cleanup level (10 µg/100 cm^2). The result was as follows: TO216=11 µg/100 cm^2
	07 Feb 02	One drainage structure was cleaned and sampled. No further action was recommended.	N/A	≤1 mg/kg (soil) ≤10 µg/100 cm^2 (concrete)	All soil and concrete verification sample results do not exceed the cleanup levels (1 mg/kg and 10 µg/100 cm^2).
	31 Jan 03	A bulk concrete sampling event was conducted. PCB concentrations exceeding the bulk concrete cleanup level were reported for two sampling locations.	N/A	≤1 mg/kg (bulk concrete)	Two bulk concrete sample results exceeded the cleanup level (1 mg/kg). The results were as follows: TO259 = 2.8 mg/kg TO261 = 3.7 mg/kg
K-14	26 Jan 04 – 27 Jan 04; 19 May 04; 07 Jun 04	Excavation and over-excavation were conducted at this site. [b]	In total, 59.2 bcy of soil was excavated and 77 lcy treated (includes over-excavated volume).	≤1 mg/kg (soil)	One soil confirmation sample result was above the cleanup level (1 mg/kg). The result was as follows: TU1300 = 47 mg/kg
W-4/ W-5	02 Feb 04 – 08 Jul 04; 16 Feb 05	Excavation and over-excavation were conducted at this site. [b]	In total, 18.4 bcy of soil was excavated and 23.9 lcy treated (includes over-excavated volume).	≤1 mg/kg (soil)	One soil confirmation sample result was above the cleanup level (≤1 mg/kg). The result was as follows: TU1495 = 40.0 D mg/kg All results for confirmation samples collected outside of the transformer fence do not exceed the cleanup level.

bcy bank cubic yard
cy cubic yard
D the reported value is derived from analysis of diluted sample extract
lcy loose cubic yard
N/A not applicable

[a] The volume difference between excavated soil (measured in bcy) and treated soil (measured in lcy) is a result of the thermal desorption process, which increases the pore spaces and voids within the soil.

[b] Over-excavation was conducted when post-excavation confirmation sampling results were above the cleanup levels. This consisted of soil sampling and analysis to evaluate the lateral and vertical extent of remaining contamination and then excavating soil to the newly established excavation limits.

2.6 BASIS FOR TAKING REMEDIAL ACTION

The primary risks to human health and the environment at the three transformer sites are posed by PCBs in soil and concrete. PCB-containing fluids may have been released to surface soil or concrete by leaking directly from the transformers or during regular transformer testing and maintenance. Transformer maintenance included periodic sampling to test the dielectric properties of the transformer fluid. Once testing was completed, the fluid was reportedly poured onto the adjacent areas, such as soil, grass, concrete pad, or building walls. Data reported for samples previously collected by the Navy confirmed the presence of PCB contamination at the sites.

The NTCRAs included removal of soil and concrete containing PCBs at concentrations above cleanup levels, followed by thermal desorption treatment of the excavated soil and concrete. Afterward, post-excavation confirmation samples were collected to evaluate whether the cleanup levels had been achieved. Post-excavation confirmation sampling results showed PCB concentrations in soil and concrete above the Toxic Substances Control Act (TSCA) high-occupancy action levels (≤1 milligram per kilogram [mg/kg] for soil and ≤10 micrograms/100 square centimeters for concrete) and the State of Hawaii Department of Health (DOH) Tier 1 soil action level (SAL) (1 mg/kg) for unrestricted use (DOH 2005).

Previous site investigations identified PCBs as the chemical of concern for the Various Transformer Sites (Table 2-3). The results and preliminary remediation goals (based on cleanup levels) were documented in the record of decision (ROD) (DON 2010).

Table 2-3: Chemicals of Concern and PRGs for Various Transformer Sites

Chemical of Concern	Media	Maximum detected concentration	PRG
Site TD-10			
PCBs	Concrete wipe	11 µg/100 cm^2	≤10 µg/100 cm^2 [a]
	Concrete bulk	3.7 mg/kg	≤1 mg/kg [b]
Site K-14			
PCBs	Soil	47.0 mg/kg	1 mg/kg [b]
Site W-4/W-5			
PCBs	Soil	40.0 mg/kg	1 mg/kg [b]

Source: DON 2010.
µg microgram
cm^2 square centimeter
N/A not applicable
PRG preliminary remediation goal
[a] TSCA high occupancy action level (40 CFR Part 761).
[b] DOH Tier 1 SAL for unrestricted use (DOH 2005).

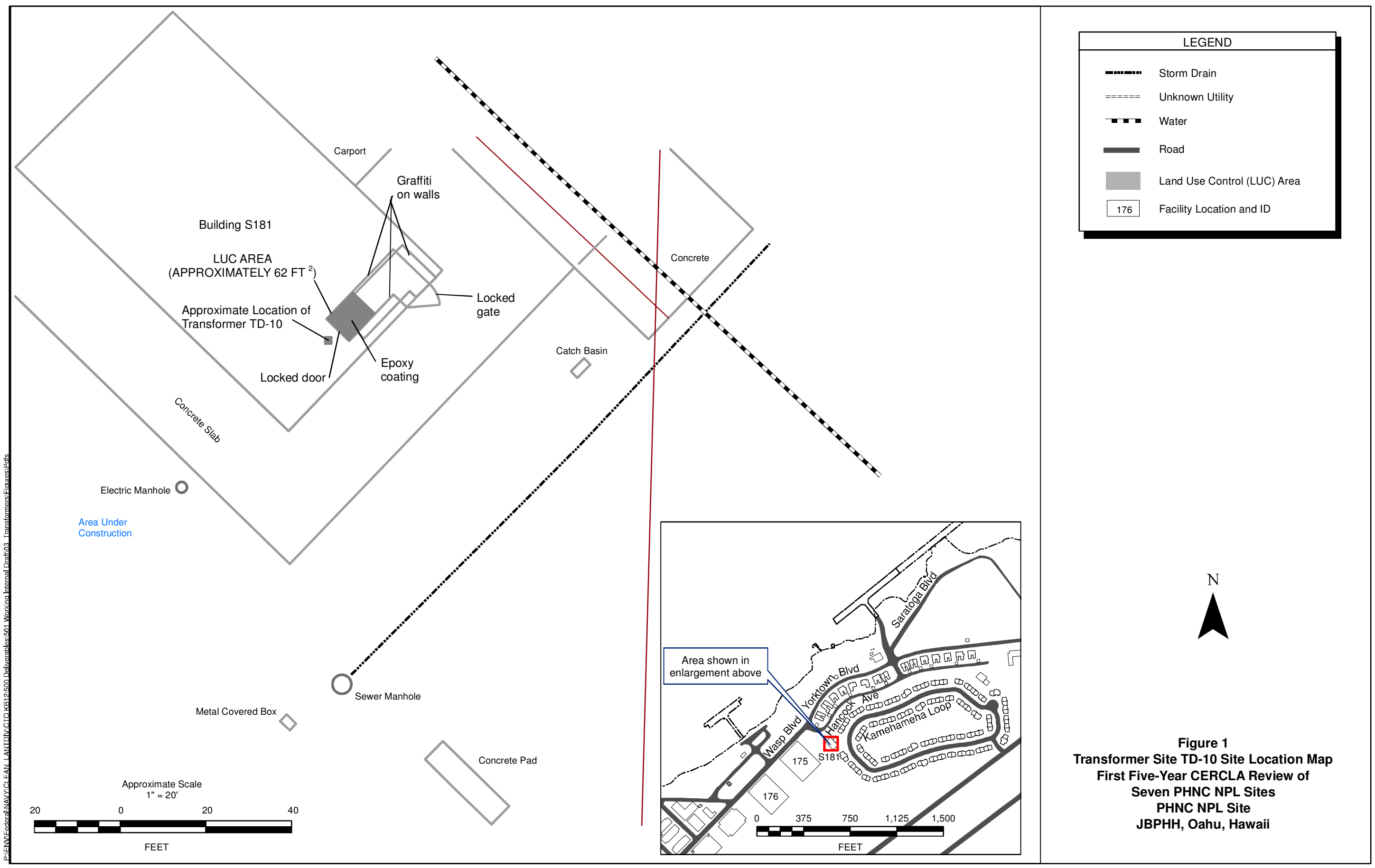

Figure 1
Transformer Site TD-10 Site Location Map
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

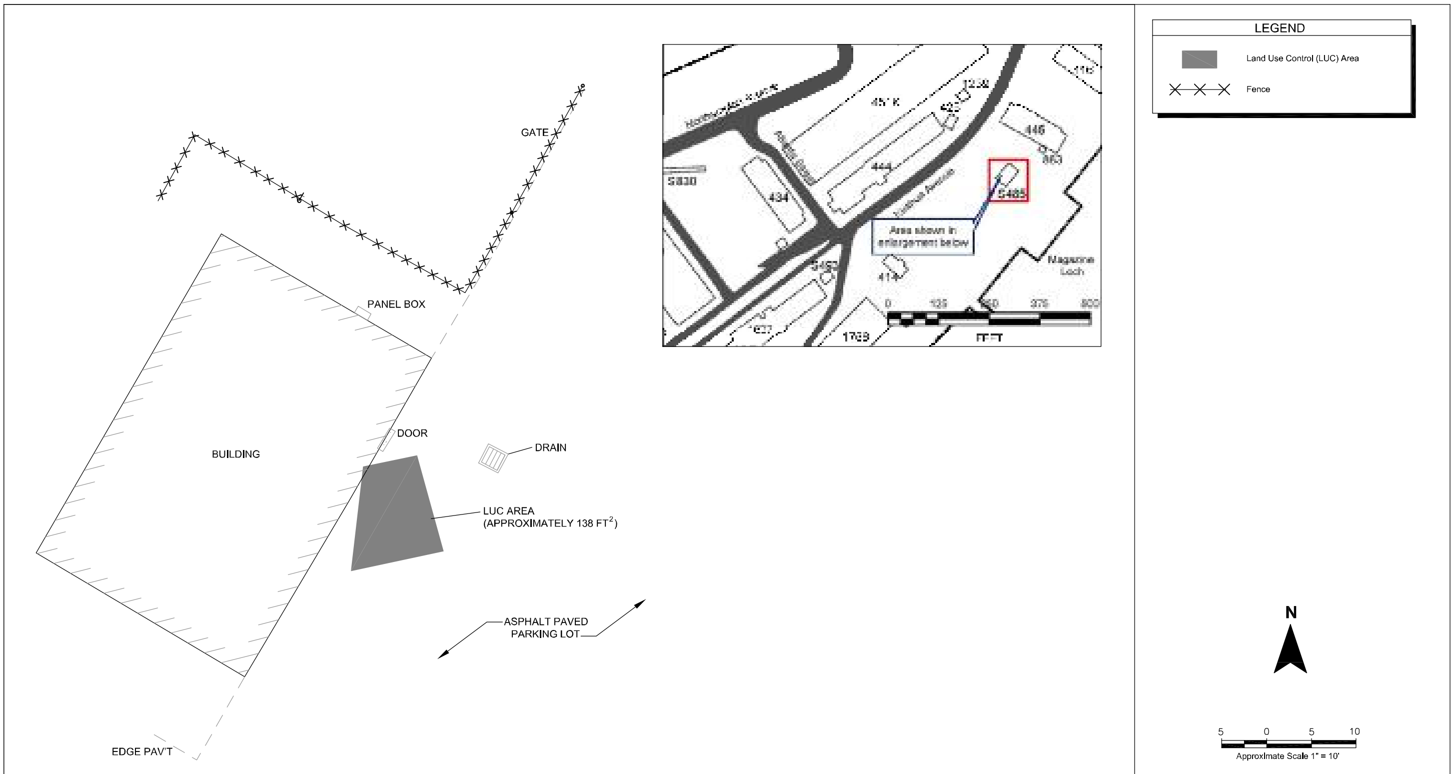

Figure 2
Transformer Site K-14 Site Location Map
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

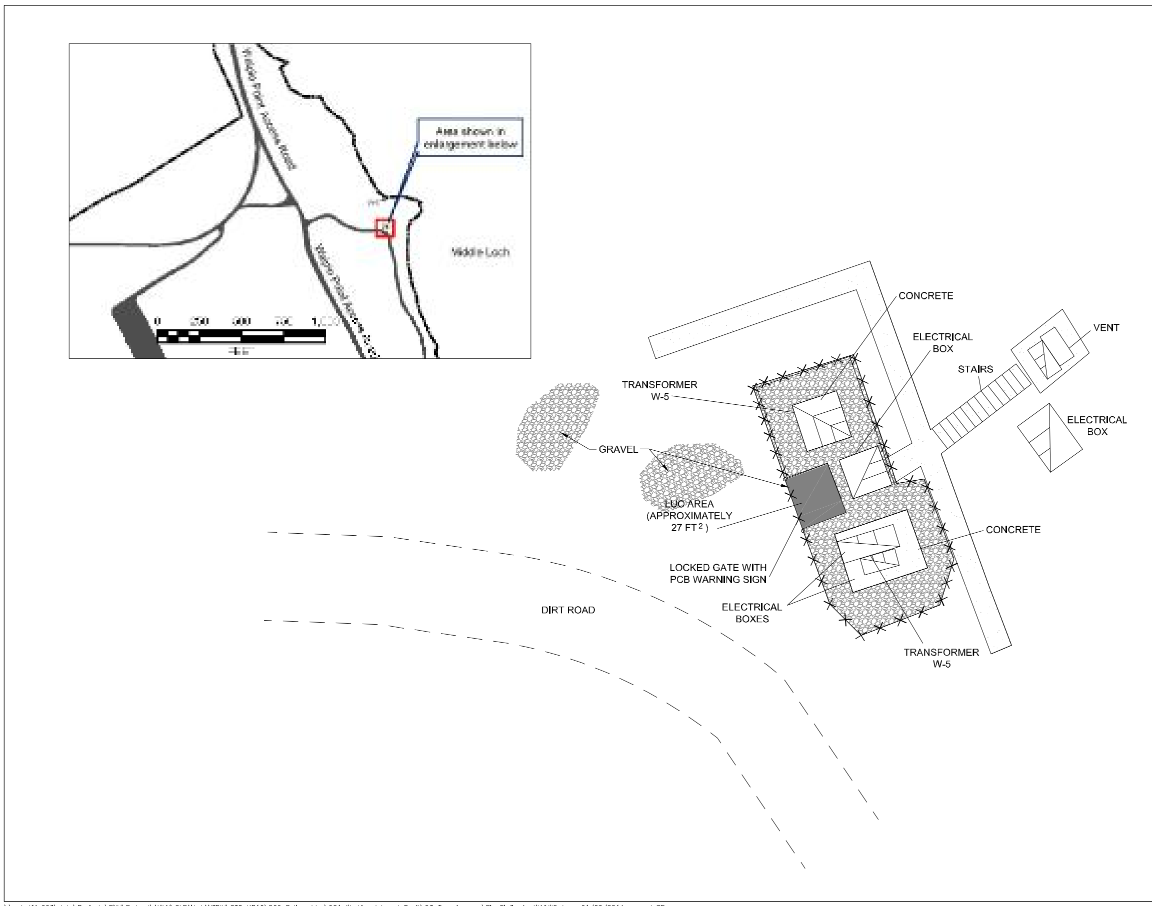

Figure 3
Transformer Site W-4/W-5 Site Location Map
First Five-Year CERCLA Reveiw of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

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3. Remedial Actions

A record of decision (ROD) documenting the final remedy selected to address PCB contamination at transformer sites TD-10, K-14, and W-4/W-5 was signed in 2010. The ROD specifies LUCs as the final remedy for the sites (DON 2010).

3.1 Remedial Action Objectives

Following removal and/or encapsulation of PCB-contaminated soil and concrete from Transformer Sites TD-10, K-14, and W-4/W-5, the Navy determined that LUCs would be required for the sites to provide continued protection of human health and the environment. The remedial action objectives developed for the three transformer sites are as follows:

- Comply with local, state, and federal regulations.
- Implement LUCs to restrict the sites to low-occupancy use and provide long-term protection of human health and the environment.
- Prevent contact of future residents with PCB-contaminated soil and concrete at concentrations in excess of the TSCA cleanup standards in 40 Code of Federal Regulations (CFR) 761.61(a)(4).

3.2 Remedy Description

The Navy and EPA, with the concurrence of the DOH, selected LUCs as the final remedy for the three PHNC transformer sites. Under the remedy, the Navy has modified its internal procedures to ensure that land use at the three transformer sites remains low-occupancy. If the Navy transfers the property, the Navy would ensure that the deeds and deed notices comply with TSCA requirements for land use restrictions. LUCs for these sites will remain in effect until a ROD addendum or other documentation is prepared based on the intent to change land use. Figure 1, Figure 2, and Figure 3 show each of the three transformer sites and the boundaries of the LUC areas. The elements of the selected final remedy include administering LUCs to restrict land use to low-occupancy use only, and to ensure the long-term viability of the final remedy.

3.3 Remedy Implementation

A remedial action work plan (RAWP) was prepared to document the methods and procedures developed to implement LUCs as the final remedy for the site (AECOM 2011). The LUCs developed for the site, as described in the RAWP, are summarized below.

TD-10:

- Continued use of porous surfaces, such as concrete transformer pads, is permitted if the surface is treated with two solvent-resistant and water-repellent coatings and the appropriate warning label that identifies the presence of PCBs is attached in accordance with 40 CFR 761.30(p). The Navy shall ensure that the double-coated epoxy paint applied to the concrete pad of TD-10 remains intact. Consistent with this obligation, the Navy shall notify any party proposing to undertake any modifications that affect the site that the concrete surfaces at the site are, or may be, contaminated. The Navy shall further require the party to handle or dispose of any contaminated concrete in accordance with all applicable laws and regulations. In addition, any damage, whether accidental or produced by natural wear and tear, to the double-coated epoxy painted surfaces or the identifying labels shall be reported and repaired to prevent potential exposure.

K-14:

- The Navy shall ensure that any land modifications (such as clearing vegetation, excavation, landscaping, and construction or demolition of any hardscape, defined as sidewalks, walls, fences, paved asphalt, and concrete pads); structural modifications (for example, construction, renovation, or demolition of any structures); or maintenance or removal work to existing utility or fuel lines that affects this site and that involves handling or disposal of potentially contaminated soil shall be in accordance with all applicable laws and regulations. Consistent with this obligation, the Navy shall notify any party proposing to undertake any activity that will affect the site that the soil on the site is, or may be, contaminated. In addition, the Navy shall require the party to handle or dispose of any contaminated soil in accordance with all applicable laws and regulations. Before the activities begin, the Navy shall require the party to demonstrate to the Navy's satisfaction how contaminated soil will be handled or disposed of in accordance with all applicable laws and regulations. The Navy will describe any land modifications and the procedures used to handle and dispose of contaminated soil in accordance with the applicable laws and regulations in the five-year review reports for the site.

W-4/W-5:

- The Navy shall ensure that any land modifications (such as clearing vegetation, excavation, landscaping, and construction or demolition of any hardscape, defined as sidewalks, walls, fences, paved asphalt, and concrete pads) that affects this site and that involves handling or disposal of potentially contaminated soil shall be in accordance with all applicable laws and regulations. The fence surrounding this site must be maintained and warning signage properly posted in accordance with 40 CFR 761.61(4)(B)(2) to identify the presence of PCBs in the soil. Consistent with this obligation, the Navy shall notify any party proposing to undertake any land modifications that affect the site that the soil at the site is, or may be, contaminated. The Navy further shall require the party to handle or dispose of any contaminated soil in accordance with all applicable laws and regulations. Before the proposed land modification begins, the Navy shall require the party to demonstrate to the Navy's satisfaction how contaminated soil will be handled or disposed of in accordance with all applicable laws and regulations. The Navy will describe any land modifications and the procedures used to handle and dispose of contaminated soil in accordance with the applicable laws and regulations in the five-year review reports for the site.

3.4 SYSTEMS OPERATIONS AND MAINTENANCE

Except for compliance monitoring, the TD-10, K-14, and W-4/W-5 Transformer Sites do not have operation and maintenance (O&M) costs. According to the remedial project manager (RPM), no significant cost variances indicative of potential problems were identified with regards to the O&M costs.

4. Progress since the Last Five-Year Review

This is the first five-year review for TD-10, K-14, and W-4/W-5 transformer sites; consequently, there is no progress to report.

5. Five-Year Review Process

5.1 Administrative Components

The public was notified of the initiation of this five-year review in July 2013. The five-year review team members are listed in Table 5-1.

Table 5-1: Five-Year Review Team Members

DOH	Regulatory Project Manager: Maria Reyes/Wendy Ray
DON	RPM for five-year review: Jan Kotoshirodo
	RPM for specific site: Jan Kotoshirodo
EPA	Regulatory Project Manager: Christopher Lichens
AECOM	Project Manager: Dean Baxley
	Deputy Project Manager: Teresa Quiniola
	Project Support: Dustin Goto, Andrea VonBurg Hall

AECOM AECOM Technical Services, Inc.
DON Department of the Navy, United States

The team members established a review schedule extending from May to December 2013, during which they performed community involvement activities related to the current five-year review, reviewed relevant documents and data, inspected the site, and interviewed the site project manager and regulators.

5.2 Document Review

This five-year review includes a review of relevant documents and may include the following: O&M records, the ROD, remedial investigations, feasibility studies, risk assessments, work plans, remedial designs, completion reports, long-term monitoring and operation reports, LUC inspection reports, monitoring data, and various compliance reports. The list of site-specific documents reviewed is provided in Section 9. Applicable cleanup standards, as listed in the ROD, were reviewed. Applicable or relevant and appropriate requirements and to be considered criteria that may have changed since the ROD was completed were evaluated. The ROD identified the DOH Tier 1 SAL of 1 mg/kg for PCBs as a to-be-considered criterion (DON 2010). However, the SAL is now known as an environmental action level and the current value for soil is 1.1 mg/kg. However, the TSCA action levels for PCBs have not changed and, therefore, the cleanup standard remains 1.0 mg/kg.

5.3 Data Review

A LUC Compliance Certificate inspection was completed on 20 September 2012 for the reporting period of 1 November 2011 through 31 October 2012. The inspection indicated that the TD-10, K-14, and W-4/W-5 sites were in compliance in regards to ten criteria, including fencing, signage, development or excavation, and the condition of any protective capping.

5.4 Site Inspection

Five-year review site inspections were conducted on 23 June 2013 at the K-14 transformer site, on 24 June 2013 at the W-4/W-5 transformer site, and on 12 September 2013 at the TD-10 transformer site. The site inspections were conducted to assess the operations and effectiveness of the LUCs at each site. During the site visits, the weather was generally sunny and the temperature averaged 80 degrees Fahrenheit. As observations were made, a five-year review site inspection checklist was completed to document the status of each site (see Attachment A).

TD-10

The TD-10 LUC area is located within Bldg. S181 behind a gated entrance secured with a lock. Graffiti was observed within the locked area. However, the RPM indicated that the gate was installed in order to prevent trespassers from accessing the area. The epoxy coating over the concrete pad appeared intact, with no visible cracks. The site inspection identified only one significant issue at the LUC area: no signage was present in the area or at the entrance to identify the LUC area or the presence of PCBs.

K-14

The site inspection identified no significant issues at the K-14 LUC area. The asphalt pavement over the LUC area appeared intact, with no significant cracks or openings. No additional evidence of ground disturbance (e.g., cuts in asphalt) was observed within the LUC area. No signage was observed at the site; however, no signage is necessary because signage is not required at sites with less than 50 mg/kg with a cap that limits direct exposure to PCB concentrations in the soil. The LUC area is currently used for vehicle parking, and is part of a larger parking area.

W-4/W-5

The site inspection identified no significant issues at the W-4/W-5 LUC area. The graveled LUC area is within a larger fenced area secured with a lock and chain. Gravel appeared undisturbed and was completely covering underlying soil. A sign posted on the fencing directly in front of the LUC area reads “Caution Contains PCBs.”

Photographs from the site visit are presented in Attachment B.

5.5 INTERVIEWS

The following personnel were interviewed:

Name	Affiliation	Date
Maria Reyes	DOH, Regulatory Project Manager	14 November 2013
Christopher Lichens	EPA, Regulatory Project Manager	12 November 2013
Jan Kotoshirodo	NAVFAC Hawaii, RPM	15 November 2013

NAVFAC Naval Facilities Engineering Command

The RPM and regulatory project managers indicated that the remedy for the various transformer sites is functioning as expected. The DOH regulatory project manager indicated that signs at the sites should be clear, visible, and in good condition.

Interview forms are presented in Attachment C.

6. Technical Assessment

Answers to the following three key technical questions are presented in tabular format below:

- A: Is the remedy functioning as intended by the decision documents?
- B: Are the assumptions used at the time of remedy selection still valid?
- C: Does any other information call into question the protectiveness of the remedy?

A review of the conceptual site model for the Various Transformer Sites indicated no significant changes to land use or site conditions that would affect the remedy effectiveness.

SITE: Various Transformer Sites
QUESTION A: Is the remedy functioning as intended by the decision documents?

Element	Assessment
Remedial Action Performance	The final remedy implemented at the Various Transformer Sites is LUCs. LUCs are the non-technical and non-engineering actions that mitigate potential risks to human health and the environment by restricting access to contaminated media. The physical barriers placed to prevent exposure to contaminated soil and concrete remain intact at each site (i.e., encapsulated concrete [double-painted with epoxy encapsulant] [site TD-10]), clean, backfilled soil and asphalt [site K-14]; and clean, backfilled soil and gravel cap [site W-4/W-5].
System Operations/O&M	No active systems are in place.
Cost of Systems Operations/O&M	No cost variances that suggest the remedy is not functioning properly were identified.
Opportunities for Optimization	No opportunities for optimization were identified.
Early Indicators of Potential Remedy Failure	The remedy is functioning as intended. However, no PCB warning signs were present at transformer site TD-10. As specified in the RAWP (AECOM 2011) sign should be posted at TD-10 in accordance with TSCA (CFR 1998).
Implementation of Institutional Controls and Other Measures	The TD-10 and W-4/W-5 transformer sites are secured with locked gates to prevent unauthorized access. The K-14 site is capped with asphalt to prevent exposure. However, for concrete surfaces contaminated with PCBs (e.g., the concrete area at TD-10), a PCB large mark must be placed in a location where it is visible (CFR 1998, 40 CFR §761.30 [p]). All sites are located within JBPHH, a secure facility that vigorously enforces entry restrictions. Administrative processes and procedures require approval for all projects involving construction or digging and subsurface disturbance. These procedures involve coordination and approval by NAVFAC Hawaii environmental personnel for projects located in or near environmental restoration sites, including LUC sites. The Navy will ensure that these or similar processes and procedures remain in place and are followed for all proposed construction, digging, and subsurface soil disturbing activities.

§ section

SITE: VARIOUS TRANSFORMER SITES
QUESTION B: Are the assumptions used at the time of remedy selection still valid?

Element	Assessment
Changes in Standards and TBC Requirements	Regulatory requirements including TSCA cleanup levels and DOH Tier 1 SALs were considered in the selection of the final remedy. Changes to cleanup levels are discussed below under Changes in Toxicity and Other Contaminant Characteristics.
Changes in Exposure Pathways and Land Use	At the time of the ROD, Transformer site TD-10 was located in an area of mixed usage consisting of residential and commercial/light industrial facilities, Transformer site K-14 was in an industrial area, and the land surrounding transformer site W-4/W-5 was undeveloped. During the site visit, no changes in land use were observed at the LUC sites. However, the area southeast of and adjacent to the Transformer TD-10 site was under construction. Two of the three transformer sites (K-14 and W-4/W-5) contain active transformers. Currently, there are no plans to change land use at the three transformer sites. In addition, there are no plans to change the land use of the areas surrounding the three transformer sites. Foreseeable future exposure scenarios will be limited to Navy and contractor personnel involved in routine maintenance and periodic inspections of the transformers, and making any necessary repairs. All three transformer sites are located on an active Navy base used for military and industrial activities.
Changes in Toxicity and Other Contaminant Characteristics	Table 6-1 compares the PRGs used to derive the original risk estimates to the current DOH EALs (DOH 2011) and EPA regional screening levels (RSLs) (EPA 2013). There is only a slight change from the unrestricted-use DOH SAL identified in the ROD (1 mg/kg) to the current EAL (1.1 mg/kg). The TSCA criteria have not changed. However, EPA criteria were not included in the ROD. Therefore, a comparison to current residential RSLs was included in Table 6-1. The maximum detected concentration at all three sites exceeds the acceptable cancer and non-cancer risks. Remedial actions including soil removal, capping, and implementation of LUCs are protective of the industrial worker. Therefore, the changes to the EALs do not affect the RAOs. Thus, it is not necessary to update the standards used at the time of remedy selection.
Changes in Risk Assessment Methodologies	Changes in risk assessment methodologies since the time the ROD was prepared include changes in the estimation of risk from exposure to chemicals via inhalation. However, these changes do not call into question the protectiveness of the remedy for the various transformer sites because the LUCs restrict use to industrial/commercial activities. Human health risk at these sites has also been addressed by capping the areas with clean soil, asphalt, concrete, etc.
Remedy Byproducts	No remedy byproducts have been identified for consideration in this assessment.
New Contaminants and Contaminant Sources	No new contaminants or contaminant sources have been identified.
Expected Progress Toward Meeting RAOs	The site inspection results confirm that the LUCs are providing adequate long-term protection of human health and the environment and compliance with ARARs in accordance with the RAOs. The physical barriers placed to prevent exposure to contaminated soil and concrete remain intact at each site (i.e., encapsulated concrete [double-painted with epoxy encapsulant] [site TD-10]), clean, backfilled soil and asphalt [site K-14]; and clean, backfilled soil and gravel cap [site W-4/W-5]. Exposure pathways that could result in unacceptable risks are being controlled. The RAOs for the Various Transformer Sites remain appropriate.

ARAR applicable or relevant and appropriate requirement
EAL environmental action level
RAO remedial action objective
TBC to be considered

Table 6-1: Review of Human Health Toxicity Data Used in Risk Assessment

Detected Analyte	MDC within LUC Area	Original Industrial PRG [c]	Does MDC Exceed Original PRG?	Current EPA RSL	Current EPA RSL Basis	Current DOH EAL	DOH EAL Basis	Does MDC Exceed Current EAL or RSL?	Cancer Risk [a] Based on Current RSL and MDC	Non-cancer HI [b] Based on Current EAL and MDC	Conclusion
Transformer TD-10											
Total PCBs (concrete bulk) [c]	3.7 mg/kg	1 mg/kg	Yes	NA	NA	1.1 mg/kg	NA	NA	NA	3.4E+00	MDC still exceeds RSL and EAL; current risk is above acceptable cancer risk range of 10^{-6} to 10^{-4} and noncancer HI of 1.0 [d]
Total PCBs (concrete wipe) [c]	11 µg/100 cm^2	10 µg/100 cm^2	Yes	NA	NA	10 µg/ 100 cm^2	NA	Yes	NA	NA	MDC still exceeds PRG [d]
Transformer K-14											
Total PCBs	47 mg/kg	1 mg/kg	Yes	0.22	Cancer	1.1 mg/kg	Noncancer	Yes	2.1E+02	4.3E+01	MDC still exceeds RSL and EAL; current risk is above acceptable cancer risk range of 10^{-6} to 10^{-4} and noncancer HI of 1.0 [d]
Transformer W-4/W-5											
Total PCBs	40 mg/kg	1 mg/kg	Yes	0.22	Cancer	1.1 mg/kg	Noncancer	Yes	1.8E+02	3.6E+01	MDC still exceeds RSL and EAL; current risk is above acceptable cancer risk range of 10^{-6} to 10^{-4} and noncancer HI of 1.0 [d]

Sources: MDCs (DON 2010), Original PRGs (DOH 2005, CFR 1998), Current EPA RSLs (EPA 2013), Current DOH EALs (DOH 2011).

C cancer
HI hazard index
MDC maximum detected concentration
NA not applicable
NC non-cancer

[a] Industrial cancer risk is derived using the following equation: (MDC/Current PRG) x (target risk level [10^{-6}]).
[b] Industrial non-cancer HI is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).
[c] TSCA high-occupancy action levels (CFR 1998).
[d] See Section 6, Question B: Changes in Toxicity and Other Contaminant Characteristics for discussion.

SITE: VARIOUS TRANSFORMER SITES QUESTION C: Does any other information call into question the protectiveness of the remedy?	
Element	**Assessment**
Overall	No information that would call into question the protectiveness of the remedy has been identified.

7. Issues, Recommendations, and Follow-up Actions

Issues identified during the site inspection and interviews are listed in Table 7-1.

Table 7-1: Issues and Recommendations for the Various Transformers Site

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Affects Protectiveness? (Y/N)	
				Current	Future
No LUC signage is present at the TD-10 transformer site. In addition, for the LUC area at TD-10, a large PCB mark is required in accordance with 40 CFR 761.45.	Install PCB warning signs to prevent ground disturbance and warn of a chemical hazard.	Navy	EPA/DOH	N	Y

8. Protectiveness Statement

The remedy at the TD-10, K-14, and W-4/W-5 transformer sites, a PHNC NPL site on Oahu, Hawaii, are protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.

No changes in land use are expected in the foreseeable future.

9. References

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First Five-Year CERCLA Review
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Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Attachment A: Five-Year Review Site Inspection Checklist

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. "N/A" refers to "not applicable."

I. SITE INFORMATION

Site Name: Various Transformer Sites	**Date of Inspection:** July 23 and 24, September 12, 2013
Location and Region: Honolulu, HI	**EPA ID:** HI4170090076
Agency, office or company leading the five-year review: NAVFAC Hawaii /AECOM	**Weather/temperature:** Sunny, 80 °F

Remedy Includes: (Check all that apply)
☐ Landfill cover/containment
☒ Access controls
☒ Institutional controls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
☒ Other – LUCs

Attachments: ☐ Inspection team roster attached ☐ Site map attached
Inspection Team Members:
Dustin Goto (AECOM)
Teresa Quiniola (AECOM)

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** ☒ N/A
2. **O&M Staff** ☒ N/A

3. Local regulatory authorities and response agencies (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency Hawaii Department of Health

Contact	Name	Title here	Date	Phone Number
	Maria Reyes	Remedial Project Mgr.	November 14, 2013	808-586-4249

Agency EPA Region 9

Contact	Name	Title here	Date	Phone Number
	Christopher Lichens	Remedial Project Mgr.	November 12, 2013	415-972-3149

Problems, suggestions: ☒ Report attached to Five-Year Review Report (Refer to Attachment C)
Remarks:

4. Other interviews (optional) ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Jan Kotoshirodo, NAVFAC RPM (November 15, 2013)

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1. O&M Documents Remarks:	☐ Readily available	☐ Up to date	☒ N/A
2. Site-Specific Health and Safety Plan	☐ Readily available	☐ Up to date	☒ N/A
3. O&M and OSHA Training Records	☐ Readily available	☐ Up to date	☒ N/A
4. Permits and Service Agreements	☐ Readily available	☐ Up to date	☒ N/A
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
7. Groundwater Monitoring Records	☐ Readily available	☐ Up to date	☒ N/A
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records	☐ Readily available	☐ Up to date	☒ N/A
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A

IV. O&M COSTS

1. O&M Organization

☐ N/A ☐ Contractor for State
☒ Other: PRP ☐ Contractor for PRP

2. O&M Cost Records

☐ Readily available ☐ Up to date
☒ Funding mechanism/agreement in place
Original O&M cost estimate N/A ☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

None

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on map ☒ Gates secure ☐ N/A

B. Other Access Restrictions

1. Signs and other security measures ☒ Signs ☐ N/A

Remarks: Signs were not present at the TD-10 site. No fencing or signs were observed at the K-14 transformer site, which is used as a parking lot. However, since an asphalt cap is in place at K-14, no signage is required. Transformer site W-4/W-5 contained a PCB warning sign.

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Remarks: The epoxy coating at TD-10 was intact, but should contain a PCB warning label. No evidence of ground disturbance was observed at K-14 and W-4/W-5.

Type of monitoring (e.g., self-reporting, drive by) No regular monitoring is performed, except LUC inspection.
Frequency: Annual
Responsible party/agency NAVFAC Hawaii

V.C ACCESS AND INSTITUTIONAL CONTROLS (cont'd)			
Contact Name: Jan Kotoshirodo	Title RPM	Date 11/15/2013	Phone No. 808-471-1171 X 341
Reporting is up-to-date	☒ Yes	☐ No	☐ N/A
Reports are verified by the lead agency	☒ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☒ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A
Other problems or suggestions:			
2. Adequacy ☒ ICs are adequate	☐ ICs are inadequate	☐ N/A	
Remarks: PCB warning signage should be posted at the TD-10 site.			
D. General			
1. Vandalism/trespassing	☒ Vandalism evident	☐ No vandalism evident	
Remarks: Graffiti was observed on the walls surrounding encapsulated area at the TD-10 site. However, the TD-10 site is currently secured with a locked gate, preventing further unauthorized access.			
2. Land use changes on site	☒ N/A		
3. Land use changes off site	☐ N/A		
Remarks: Construction was observed at the southeast adjacent site.			

VI. GENERAL SITE CONDITIONS		
A. Roads	☐ Applicable	☒ N/A
B. Other Site Conditions	☐ Applicable	☒ N/A
Remarks: A lock on the access gate at transformer site TD-10 had to be removed to gain access. A new lock was placed on the gate following the site inspection.		

VII. LANDFILL COVERS	☐ Applicable	☒ N/A

VIII. VERTICAL BARRIER WALLS	☐ Applicable	☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES	☐ Applicable	☒ N/A

X. OTHER REMEDIES
Institutional controls remain in place to prevent disturbance of the LUC areas at the three transformer sites.

XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy
The LUC areas at the TD-10, K-14, and W-4/W-5 transformer sites consist of an epoxy coating, asphalt pavement, and fencing/gravel, respectively. During the site inspection, these controls appeared intact and undisturbed.
B. Adequacy of O&M
O&M appears adequate.
C. Early Indicators of Potential Remedy Failure
None identified.
D. Opportunities for Optimization
PCB warning signage should be placed at transformer site TD-10.

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Attachment B: Site Photographs

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

Photograph No. 1: Overview of the exterior of the transformer TD-10 site, looking northwest.

Photograph No. 2: Locked gate restricting access to the TD-10 LUC area.

Photograph No. 3: Transformer TD-10 LUC area.

Photograph No. 4: Epoxy coating in TD-10 LUC area.

Photograph No. 5: Asphalt-paved LUC area at transformer K-14.

Photograph No. 6: Overview of the transformers W-4/W-5 site.

Photograph No. 7: Graveled LUC area behind locked gate at transformer site W-4/W-5.

Photograph No. 8: PCB warning sign on fencing directly in front of LUC area at transformer site W-4/W-5.

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Attachment C: Interview Forms

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

INTERVIEW RECORD

Site Name: Various Transformer Sites **DOH RPM:** Maria Reyes	**EPA ID No.:** HI4170090076
Subject: Five-Year Review Information Survey	**Time: 0917** | **Date: 11/14/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Maria Reyes	**Title:** Regulatory Project Manager	**Organization:** DOH-HEER
Telephone No.: 808-586-4249 **Fax No.:** — **E-Mail Address:** maria.reyes@doh.hawaii.gov	**Street Address:** 919 Ala Moana Boulevard, Rm 206 **City, State, Zip:** Honolulu, Hawaii 96814	

Summary of Conversation

1. How long have you been familiar with the project site?
   Since August 2009, when the project was already in the Draft Final ROD stage.
2. What is your overall impression of the project?
   They were part of investigations for all the transformers on PHNC and NCTAMS. Originally, the Navy lumped together all the transformers and as some were progressing, they would pull them out and have different documentation. I know the investigations were very thorough; Chris and I were updated regularly.
3. Is the remedy functioning as expected? How well is the remedy performing?
   They effectively keep people out of the area with fences and/or signage for two of the three sites.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No, none of those. DOH doesn't visit routinely; we only visit with the EPA when they schedule a visit.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   Signage needs to be clear, visible, and in good condition.

INTERVIEW RECORD

Site Name: Various Transformer Sites **EPA RPM:** Christopher Lichens	**EPA ID No.:** HI4170090076
Subject: Five-Year Review Information Survey	**Time: 1010** | **Date: 11/12/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Christopher Lichens	**Title:** Regulatory Project Manager	**Organization:** EPA
Telephone No.: 415-972-3149 **Fax No.:** **E-Mail Address:** lichens.christopher@epa.gov	**Street Address:** 75 Hawthorne Street **City, State, Zip:** San Francisco, CA 94105	

Summary of Conversation

1. How long have you been familiar with the project site?
   About 4 years.
2. What is your overall impression of the project?
   I think it's going according to plan.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   No.

INTERVIEW RECORD

Site Name: Various Transformer Sites **Navy RPM:** Jan Kotoshirodo	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1011**	**Date: 11/15/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Jan Kotoshirodo	**Title:** Navy Remedial Project Manager	**Organization:** Navy

Telephone No.: 808-471-1171 ext. 341 **Fax No.:** — **E-Mail Address:** jan.kotoshirodo@navy.mil	**Street Address:** 400 Marshall Road **City, State, Zip:** JBPHH, HI 96860-3139

Summary of Conversation

1. How long have you been familiar with the project site?
   Since around 2006 till present.
2. What is your overall impression of the project?
   I think we're just managing the LUC; nothing else is really happening.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   We did one inspection last year, but we have not completed one this year.
5. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities, including LUC inspections.
   No.
6. Have there been unexpected costs or difficulties at the site in the last five years (or since the ROD was signed? Please provide details.
   No.
7. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.
8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   No.
9. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
10. Do you have any comments, suggestions, or recommendations regarding the project?
    No.

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Shoreline Site Northwest of Dry Dock #3

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Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Former Pearl City Junction

Building 6

CONTENTS

Shoreline Site Northwest of Dry Dock #3

ATTACHMENTS

FIGURE

TABLES

ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing material
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DD	decision documents
DOH	Department of Health, State of Hawaii
EPA	Environmental Protection Agency, United States
JBPHH	Joint Base Pearl Harbor-Hickam
IMF	Intermediate Maintenance Facility
LUC	land use control
NPL	National Priorities List
O&M	operation and maintenance
PHNC	Pearl Harbor Naval Complex
PHNSY	Pearl Harbor Naval Shipyard
RAB	Restoration Advisory Board
RAO	remedial action objective
RAWP	Remedial Action Work Plan
ROD	record of decision
RPM	remedial project manager
TCRA	time-critical removal action
U.S.	United States

1. Site Chronology

The Shoreline Site Northwest of Dry Dock #3 (Shoreline Site) is a land use control (LUC) site in the Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) sites at Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii. Significant events relevant to this site are presented in Table 1-1.

Table 1-1: Shoreline Site Northwest of Dry Dock #3 Site Chronology of Events

Event	Date of Event
Historical aerial photographs suggested that the Shoreline Site area of Pearl Harbor may have been used to dock Navy surface vessels during World War II. Rubble (including keel blocks and asbestos-containing cloth attached to cement kiln bricks) was used as fill material to stabilize the area (DON 2010).	1940s-1950s
A Navy laboratory analyzed suspected asbestos-containing material (ACM) collected from the Shoreline Site (DON 2010).	1993
A tarpaulin cover was placed over ACM considered to pose an inhalation risk to site workers (DON 2010).	1994
Additional ACM sampling was conducted at the Shoreline Site (Ogden 1997).	1997
A site evaluation (preliminary assessment and site inspection) was conducted at the Shoreline Site (Ogden 1998). Refractory cloth and cement kiln bricks containing greater than 1 percent asbestos fibers were identified.	1998
A time-critical removal action (TCRA) of the ACM-containing soils was performed. ACM debris were identified and removed within an initial 8-foot by 2-foot area. Additional ACM debris was identified, and the excavation was expanded to a 3-foot-wide area extending approximately 50 feet along the shoreline, to a maximum depth of 8 feet (DON 2000).	1999-2000
An action memorandum dated 9 February 2001 documented the decision to undertake a TCRA and the selection of excavation and offsite disposal as the preferred action (DON 2001).	2001
No Action was recommended as the final remedy in the *Proposed Plan, Shoreline Site Northwest of Dry Dock #3, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility, Oahu, Hawaii* (DON 2006). A public comment period was held; no comments that would impact the no further action (NFA) decision were received.	2006
The United States Environmental Protection Agency (EPA) issued a letter raising concerns about the protectiveness of the 1 percent asbestos fibers cleanup goal. Subsequent discussions among the Navy, EPA, and State of Hawaii Department of Health (DOH) led to the conclusion that the proposed “no action” remedy may not be protective of human health. Furthermore, it was questioned whether the rubble fill underlying the paved areas with office trailers east and south of the excavation also contain ACM (DON 2010).	2006
A record of decision (ROD) was completed (DON 2010). The ROD re-evaluated the removal action alternatives and recommended the construction of a permanent cover (e.g., concrete) over affected areas and the application of engineering controls (e.g., fencing, warning signs) and institutional controls restricting future site access.	2010
A remedial action work plan was completed for the implementation of the concrete cap and LUCs (ERRG 2011).	2011
A remediation verification report was published to document the following activities at the Shoreline Site in accordance with the ROD: grading, installation of geotextile and placement of base course, construction of concrete cap, a metes and bounds survey, and installation of LUC signs (ERRG 2012).	2011
A remedial action completion report was published to formally document that the following remedial action objectives required for the Shoreline Site had been implemented: constructing a concrete cap over soil that is potentially contaminated with asbestos and ACM and installing LUC signs (AECOM 2012).	2012

2. Background

2.1 Site Description

The Shoreline Site is located northwest of Dry Dock #3, within the Controlled Industrial Area of the JBPHH, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF), Oahu, Hawaii (Figure 1). The site is part of the PHNC NPL site under the United States (U.S.) Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System Number HI4170090076. Historical aerial photographs suggest that the site may have been used to dock U.S. Navy surface vessels during World War II. The site boundaries initially encompassed a flat and narrow piece of land approximately 800 feet long and 8 feet wide, elevated approximately 7 to 10 feet above the open water in the adjacent harbor; however, the site was later expanded eastward to include the paved office trailer area. Large, heavy concrete keel blocks border the shoreline at the site to the north and west. The size of the Shoreline Site is approximately 0.18 acres.

Previous investigations identified asbestos-containing cloth and asbestos fibers in soil, and concluded that a response action was warranted because the asbestos may pose unacceptable risk to human health.

2.2 Physical Characteristics

2.2.1 Topography

The Shoreline Site is generally flat, lying approximately 3 feet above mean sea level. Surface water is expected to flow west across the site toward Pearl Harbor.

2.2.2 Geology and Soils

Soils on the coastal plain surrounding Pearl Harbor, including the Pearl City Peninsula, Waipio Peninsula, and Ford Island, are derived primarily from the caprock formation. The caprock consists of interbedded terrestrial and marine deposits including alluvium eroded from the Koolau Volcanics and coralline limestone sediments. Low permeability clay and silty clay units in the caprock form confining layers over a deep artesian aquifer in the underlying fractured Koolau basalts (Earth Tech 2006).

Soils at JBPHH, PHNSY & IMF on the coastal plain immediately east of Pearl Harbor are also dominated by material derived from the caprock sediments. However, tuff deposits of the Honolulu Volcanic series underlie the caprock soils and fill material, and therefore may contribute material to subsurface soils in this area (Earth Tech 2006).

2.2.3 Groundwater Hydrology

Groundwater conditions at PHNSY & IMF, which includes the Shoreline Site, are typical of the area surrounding Pearl Harbor. Unconfined caprock groundwater occurs in near-surface sediments that overlie and confine the basal aquifer within the fractured basalt bedrock. The caprock water table occurs at relatively shallow depths, ranging from approximately 11 to 13 feet below ground surface (bgs). The caprock groundwater originates from infiltration of precipitation upgradient of the PHNSY & IMF, combined with intrusion of seawater from the harbor; upward discharge from the deep basal aquifer may also recharge the caprock at some locations. Caprock groundwater at the PHNSY & IMF is in direct hydraulic connection with Pearl Harbor and is tidally influenced (Earth Tech 2007).

The predominant lithologies of the caprock formation at PHNSY & IMF are coralline sand, silt, gravel, and clay, suggesting generally low, but variable hydraulic conductivity. The PHNSY & IMF is located immediately adjacent to JBPHH, Hickam; therefore, the two areas are likely to have similar hydrogeologic properties. Based on a base-wide tidal impact characterization and groundwater chemistry analysis conducted at JBPHH, Hickam, the groundwater changes from a sodium-calcium bicarbonate-type water in the fresh water recharge or groundwater high area in the north-central part of the base to a sodium-calcium chloride-type water away from the groundwater high and closer to the coast (Earth Tech 2007).

2.3 LAND USE

The current and future use of the Shoreline Site is expected to remain as an undeveloped shoreline area adjacent to the support area for industrial activities at Dry Dock #3. Currently, the Shoreline Site is used only by support personnel at Dry Dock #3 for various activities during break periods. The PHNSY & IMF plan to continue this use into the foreseeable future.

2.4 HISTORY OF CONTAMINATION

Historical aerial photographs suggest that the Shoreline Site area of Pearl Harbor may have been used to dock Navy surface vessels during World War II. The open water adjacent to the shoreline was used to test subsurface vessel detection systems. Rubble (including keel blocks and asbestos-containing cloth attached to cement kiln bricks) was used as fill material to stabilize the area.

Several environmental investigations have been conducted at the Shoreline Site including:

- Navy laboratory analysis of suspected asbestos-containing material (ACM) in late 1993
- Site evaluation (preliminary assessment and site inspection) at the Shoreline Site from June 1994 through April 1995 (Ogden 1998)
- Additional ACM sampling in August 1997 (Ogden 1997)

These initial investigations concluded that potentially unacceptable human health risk existed at the Shoreline Site because of the presence of the asbestos. Despite the placement of a tarpaulin cover over the area of concern in July 1994, site activities that generate dust could result in airborne asbestos fibers, which may pose unacceptable risk to site workers exposed via the inhalation pathway. Construction activities involving excavation of subsurface soil could also expose workers to ACM or asbestos-containing kiln bricks, which may be present in subsurface rubble adjacent to the previous removal action portions of the Shoreline Site.

2.5 INITIAL RESPONSE

As a result of the initial investigations between 1993 and 1997, the Navy decided to perform a time-critical removal action (TCRA) of the ACM-containing soils (TCRA for ACM and verification sampling from August 1999 to July 2000 [Earth Tech 2001]).

Due to the time-critical nature of the removal action, an engineering evaluation/cost analysis of removal action alternatives was not prepared for the site. However, four removal action alternatives were developed and evaluated against the nine National Oil and Hazardous Substances Pollution Contingency Plan criteria prior to recommending the removal action. The removal action alternatives included: (1) no action; (2) maintain the tarpaulin cover and implement additional engineering controls (e.g., fencing, warning signs) and institutional controls restricting future access; (3) construct a permanent cover (e.g., concrete) over affected area and apply other engineering controls (e.g., fencing, warning signs) and institutional controls restricting future site access; and (4) excavation and offsite disposal. An action memorandum dated 9 February 2001 documented the decision to undertake the TCRA (DON 2001) and the selection of Alternative 4 (excavation and offsite disposal) as the preferred action.

The Navy conducted the TCRA in several stages between August 1999 and August 2000. The goal of the TCRA was to excavate and dispose of all materials containing greater than 1 percent asbestos fibers. ACM debris were identified and removed within the initial 8-foot by 2-foot site. During the course of the removal, additional ACM debris were identified and the excavation was expanded to a 3-foot-wide area extending approximately 50 feet along the shoreline. The Navy observed cement kiln bricks and weathered asbestos-containing cloth buried roughly 3 to 5 feet bgs. This buried ACM was removed by the Navy Public Works Center in July and August 2000. The extent of the excavation was initially determined based upon the presence of the ACM-containing refractory cloth, and was subsequently confirmed through the collection of soil samples for analysis of asbestos. The total volume of asbestos-contaminated cloth, attached cement kiln brick, and surrounding soil removed from the site was 30 cubic yards (DON 2000). All ACM waste was transported off island to a facility approved to receive CERCLA/Toxic Substances Control Act wastes. The excavation was then backfilled with clean imported fill material.

2.6 BASIS FOR TAKING REMEDIAL ACTION

As a result of the TCRA, Alternative 1 No Action was recommended as the final remedy in the *Proposed Plan, Shoreline Site Northwest of Dry Dock #3, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility, Oahu, Hawaii* (DON 2006). However, following the proposed plan and public comment period, the EPA issued a letter raising concerns about the protectiveness of the 1 percent asbestos fibers cleanup goal. No remedial standards or guidance exists as to a safe level of asbestos fibers in soil. Through subsequent discussions and meetings among the Navy, EPA, and State of Hawaii Department of Health (DOH), it was concluded that the proposed no action remedy may not be protective of human health. It was also unclear whether the rubble fill underlying the paved areas with office trailers located east and south of the excavation could contain asbestos.

As a result of the additional concerns and as a conservative measure, the site boundaries were expanded to include additional areas, and the removal action alternatives were re-evaluated in the 2010 record of decision (ROD) (DON 2010). The human health threat from ACM at the Shoreline Site was the potential for exposure of shipyard workers to airborne asbestos fibers. Asbestos is known to be hazardous to humans mainly via inhalation of small asbestos fibers. Asbestos at the site poses no known threats to the environment.

The potential health threat to shipyard workers was mitigated to a limited extent by the TCRA completed in 2000. However, asbestos fibers remaining in subsurface soil and rubble at concentrations of less than 1 percent may still threaten human health. Potential releases of airborne asbestos from the Shoreline Site, if not addressed by implementing remedial actions, could endanger worker health and result in other possible human exposure to asbestos due to unsuitable (i.e., residential) redevelopment of the site in the future.

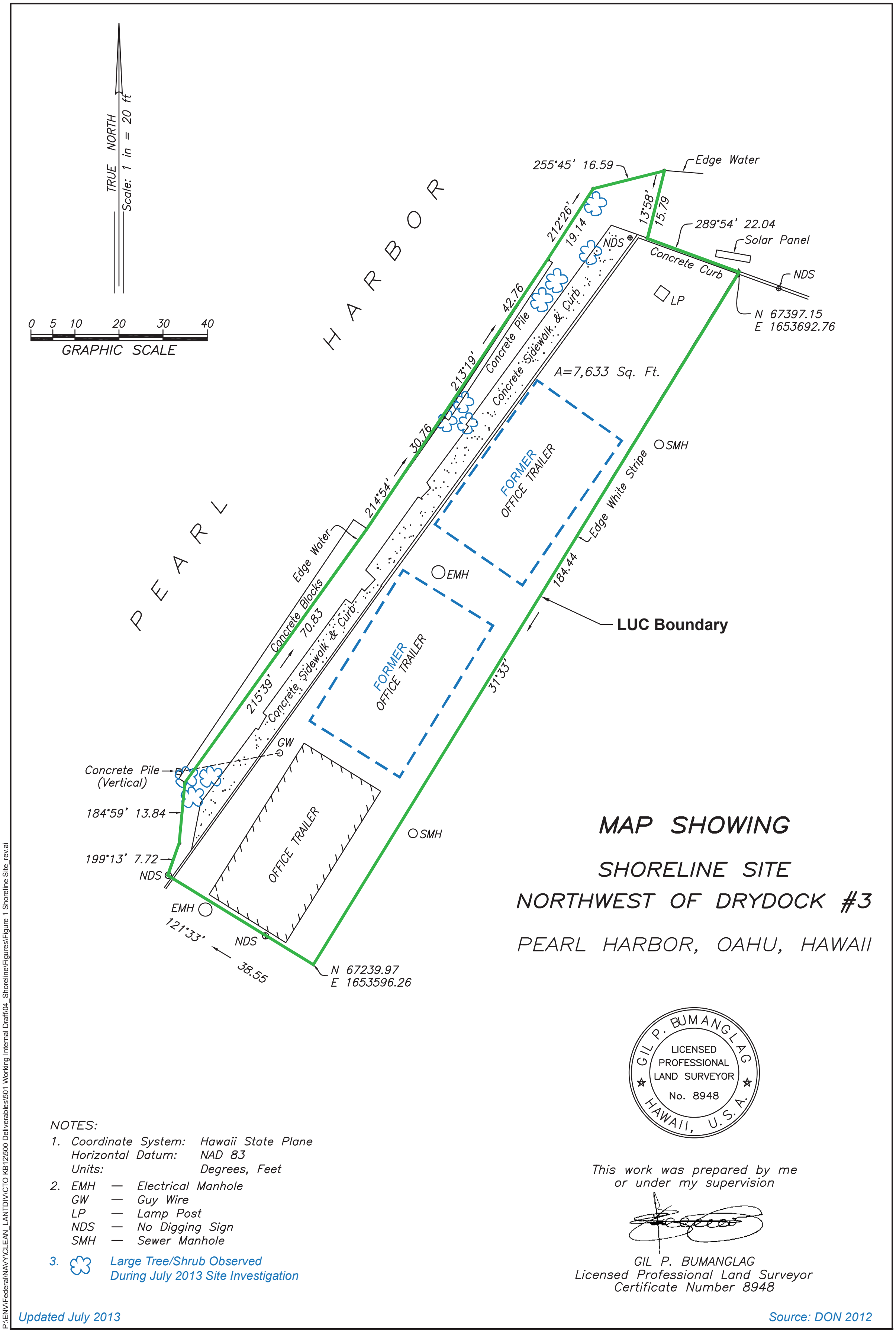

Figure 1
Shoreline Site, Site Location Map
First Five-Year CERCLA Review of Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

3. Remedial Actions

A ROD was signed in 2010 to address asbestos contamination of soil at the site. The ROD specifies containment of soils containing residual asbestos fibers (less than 1 percent in soil by volume) using a concrete cap over exposed surface soils, LUCs, routine inspections, and long-term management as the final remedy for Shoreline Site Northwest of Dry Dock #3, a PHNC NPL site on Oahu, Hawaii (DON 2010).

3.1 Remedial Action Objectives

The objectives of the selected final remedy are listed below:

- Prevent potential exposure to residual asbestos fibers in Shoreline Site soils through the installation and long-term management of a concrete cap.
- Prohibit the future development and use of the property for residential housing, elementary and secondary schools, child-care facilities, and playgrounds.
- Restrict excavation and construction activities within the LUC boundary to ensure that exposure to potential subsurface ACM debris or asbestos in soil does not occur.

3.2 Remedy Description

As documented in the ROD (DON 2010), the Navy and EPA, with the concurrence of the DOH, determined that containment of soils containing residual asbestos fibers (less than 1 percent in soil by volume) using a concrete cap over exposed surface soils, LUCs, routine inspections, and long-term management were necessary to address asbestos contamination in soil at the Shoreline Site. As part of the selected remedy, a concrete surface cap was installed in 2011 over the exposed residual contaminated soil to ensure the protection of human health. The concrete surface provides an effective barrier for containment of soils containing residual ACM or asbestos fibers. Periodic monitoring and maintenance at the Shoreline Site includes inspection of the concrete cap and asphalt paved areas to ensure their integrity. The LUC boundaries also include the area surrounding the TCRA excavation area to prevent exposure to asbestos potentially associated with kiln bricks observed in the area. The LUC area boundaries are shown on Figure 1.

The LUCs ensure that industrial land use is maintained at the Shoreline Site and prohibit any unauthorized land modifications that may disturb the proposed concrete cap or the asphalt-paved areas where office trailers for Navy personnel are located. If activities that may expose contaminated soil must occur, the Navy will ensure proper handling and disposal of the soil. Signage has also been installed at the Shoreline Site to prohibit unauthorized disturbance of soil beneath the concrete cap, asphalt-paved areas, and structures to avoid exposure of buried soil and rubble containing residual asbestos.

3.3 Remedy Implementation

A remedial action work plan (RAWP) (ERRG 2011) was prepared to implement the remedy in accordance with the 2010 ROD. The objective of the RAWP was to define each project activity associated with installing a concrete cap and outline the technical approach to be implemented for each activity. Installation of the concrete cap was initiated on 16 August 2011 and completed on 12 October 2011. Site activities included site grading, installation of geotextile and placement of base course, construction of concrete cap, and installation of LUC warning signage. The construction of the concrete cap and associated activities are summarized in the remediation verification report (ERRG 2012) and also documented in the RACR (AECOM 2012).

The following engineering controls have been implemented:

- Installed a concrete cap over potentially contaminated soil, which included the following:
  - Site grading
  - Installation of geotextile and base course aggregate
  - Placement of concrete and gunnite (shotcrete)
- Installed signage along LUC boundaries.

The following institutional controls have been implemented:

- Uploaded a record of site LUCs to the Naval Installation Restoration Information Solution (NIRIS) system in February 2012.
- Established the site as part of the Navy permit and construction review/approval processes. During the planning and/or design phase of construction projects, Navy environmental personnel will review the planning/design documents to ensure that appropriate considerations are specified as necessary to ensure protection of human health and the environment.

3.4 SYSTEMS OPERATIONS AND MAINTENANCE

Except for compliance monitoring, the Shoreline Site Northwest of Dry Dock #3 does not have operation and maintenance (O&M) costs. According to the Navy remedial project manager (RPM), no significant cost variances indicative of potential problems were identified with regards to O&M costs.

4. Progress Since the Last Five-Year Review

This is the first five-year review for the Shoreline Site Northwest of Dry Dock #3, a PHNC NPL site on Oahu, Hawaii; consequently, there is no progress to report.

5. Five-Year Review Process

5.1 Administrative Components

The public was notified of the initiation of this five-year review in July 2013. The five-year review team members are listed in Table 5-1.

Table 5-1: Five-Year Review Team Members

DOH	Regulatory Project Manager: Maria Reyes/Wendy Ray
Navy	RPM for five-year review: Jan Kotoshirodo
	RPM for specific site: Jan Kotoshirodo
EPA	Regulatory Project Manager: Christopher Lichens
AECOM	Project Manager: Dean Baxley
	Deputy Project Manager: Teresa Quiniola
	Project Support: Dustin Goto, Andrea VonBurg Hall

AECOM AECOM Technical Services, Inc.

The team members established a review schedule extending from May to December 2013, during which they performed community involvement activities related to the current five-year review, reviewed relevant documents and data, inspected the site, and interviewed the site project manager and regulators.

5.2 Document Review

This five-year review consists of a review of relevant documents including O&M records, the ROD, letter reports, site evaluations, risk assessments, work plans, remedial designs, completion reports, long-term monitoring and operation reports, and LUC inspection reports. In addition, the review was conducted in accordance with Navy guidance specific to asbestos-contaminated sites and procedures for five-year reviews (NAVFAC 2012), as well as the EPA's *Assessing Protectiveness for Asbestos Sites* (EPA 2009). The list of documents reviewed is provided in Section 9. Applicable cleanup standards, as listed in the ROD, were reviewed. None of the applicable or relevant and appropriate requirements or to be considered criteria identified for the site have changed since the ROD was completed. The RAWP (ERRG 2011), RVR (ERRG 2012), and RACR (AECOM 2012) described and documented the construction of the concrete cap, which was completed in October 2011. Site activities included site grading, installation of geotextile and placement of base course, construction of concrete cap, and installation of LUC warning signage, as well as addition to the site into the NIRIS LUC tracker database.

5.3 Data Review

A Site Inspection Compliance Certificate and Documentation for the Shoreline Site Northwest of Dry Dock #3 was completed on 9 September 2012 for the period of 31 July 2011 through 20 September 2012. The inspection did not note any conditions indicative of violations of LUCs and did not recommend any changes or additions to the LUCs (DON 2012).

5.4 Site Inspection

A five-year review site inspection at Shoreline Site Northwest of Dry Dock #3 was conducted on 23 July 2013 to assess the operations and effectiveness of LUCs at the site. During the site visit, the weather was overcast and the temperature averaged 75 degrees Fahrenheit. As observations were made, a five-year review site inspection checklist was completed to document the status of the site (see Attachment A).

No significant issues were identified regarding the LUC area. The asphalt pavement covering the eastern parking portions of the Shoreline Site appeared to be intact, aside from a few cracks. No other signs of subsidence, slope instability, or bare soil were observed. The east side of the site is used as a parking area and also contains an office trailer. The trailer is currently in a different configuration than previously depicted in the RAWP (ERRG 2011), when three trailers were present.

The north and west portions of the Shoreline Site adjoin the Pearl Harbor shoreline. Concrete blocks, shot-crete, and concrete curbs in these areas protect against erosion and are covered with the concrete cap. A few small shrubs were growing between the concrete area during the site visit and minor surface cracks were visible, but did not make the concrete friable nor appear to be affecting the stability of the erosion controls.

Two signs noting the LUC area and asbestos hazard are posted within the north and east areas of the Shoreline Site. The signs were installed fronting the harbor shoreline and facing the parking lot, and therefore may be misinterpreted as indicating that the asbestos hazard exists only in the narrow area between the signs and the water.

Photographs obtained during the site visit are presented in Attachment B.

5.5 INTERVIEWS

Interviews were conducted with the following personnel:

Name	Affiliation	Date
Maria Reyes/Wendy Ray	DOH, Regulatory Project Manager	14 November 2013
Christopher Lichens	EPA, Regulatory Project Manager	12 November 2013
Jan Kotoshirodo	NAVFAC Hawaii, RPM	15 November 2013

NAVFAC Naval Facilities Engineering Command

All three personnel agreed that the remedy is functioning as expected and confirmed that no incidents or issues have been reported. However, the DOH regulatory project manager indicated that maintenance of the concrete cap is necessary to support the remedy.

Interview forms are presented in Attachment C.

6. Technical Assessment

Answers to the following three key technical questions are presented in tabular format below:

- A: Is the remedy functioning as intended by the decision documents?
- B: Are the assumptions used at the time of remedy selection still valid?
- C: Does any other information call into question the protectiveness of the remedy?

A review of the conceptual site model for the Shoreline Site Northwest of Dry Dock #3 indicated no significant changes to land use or site conditions that would affect the remedy effectiveness.

SITE: Shoreline Site Northwest of Dry Dock #3
QUESTION A: Is the remedy functioning as intended by the DDs?

Element	Assessment
Remedial Action Performance	The final implemented remedy at the Shoreline Site Northwest of Dry Dock #3 includes the following: a concrete cap over exposed surface soils, LUCs, routine inspections, and long-term management. The concrete cap installed in 2011 was observed in good condition. LUCs are non-technical and non-engineering actions that mitigate potential risks to human health and the environment by restricting access to contaminated media. Based on observations made during the site visit, no unauthorized digging or site disturbance has occurred within the paved LUC area. In accordance with OSWER Directive #9355.7-03B-P (EPA 2009), the remedy at the Shoreline Site is therefore considered protective.
System Operations/O&M	No active systems are in place.
Cost of Systems Operations/O&M	No cost variances suggesting that the remedy is not functioning properly were identified.
Opportunities for Optimization	Signs indicating that unauthorized ground disturbance is prohibited are positioned such that they could be misinterpreted as applying only to the small area between the signs and the shoreline. The signs should be repositioned or reworded to more clearly indicate the extent of the no digging area. The concrete cap and asphalt pavement at the site should be monitored and patched as necessary to prevent more extensive holes and cracks from developing, which may expose underlying soil.
Early Indicators of Potential Remedy Failure	The remedy is functioning as intended. No indications of remedy failure were evident during the review.
Implementation of Institutional Controls and Other Measures	Signs indicating that digging is prohibited have been placed along the north and west site boundaries. JBPHH is a secure facility, and entry is restricted and vigorously enforced. Administrative processes and procedures require approval for all projects involving construction or digging and subsurface disturbance. These procedures involve coordination and approval by NAVFAC Hawaii environmental personnel for projects located in or near an environmental restoration site, to include sites that have LUCs. The Navy will ensure that these or similar processes and procedures remain in place and are followed for all proposed construction, digging, or other activities that could disturb soil beneath the concrete cap or asphalt pavement at the site.

OSWER Office of Solid Waste and Emergency Response

SITE: SHORELINE SITE NORTHWEST OF DRY DOCK #3
QUESTION B: Are the assumptions used at the time of remedy selection still valid?

Element	Assessment
Changes in Standards and TBC Requirements	As required by CERCLA, SARA, and EPA policy, remedial actions are required to attain ARARs to the extent practicable. Previous removal actions at the Shoreline Site reduced asbestos fibers in soil to the standard cleanup goal of <1 percent in soil. Although this cleanup goal was achieved, EPA Region 9 has determined that this cleanup goal may not be protective. However, there are currently no alternative cleanup standards for asbestos in soil.
Changes in Exposure Pathways and Land Use	At the time of the ROD, the Shoreline Site was an open space utilized only by support personnel at Dry Dock #3 for various activities during break periods. During the site visit, no personnel were working at the site. The only observed change in conditions was the removal of two trailers from the site. The Shoreline Site is expected to remain as an undeveloped paved shoreline area adjacent to the support area for industrial activities at Dry Dock #3, with future use limited to industrial activities only. The concrete cap remains intact, and there are no complete pathways for exposure of human receptors.
Changes in Toxicity and Other Contaminant Characteristics	The criteria for evaluating asbestos toxicity have not changed since the ROD was completed. See Table 6-1 for detailed evaluation of the toxicity data used in the risk assessment.
Changes in Risk Assessment Methodologies	No changes in risk assessment methodologies have occurred since the ROD.
Remedy Byproducts	No remedy byproducts have been identified for consideration in this assessment.
New Contaminants and Contaminant Sources	No new contaminants or contaminant sources were identified.
Expected Progress Toward Meeting RAOs	No changes in the physical condition of the Shoreline Site that would affect the protectiveness of the remedy have occurred. Although minor cracks and vegetation were observed in the concrete cap, these did not appear to impact the stability of the cap. No evidence of construction or excavation was observed. Exposure assumptions, toxicity data, and RAOs remain valid for the selected remedy. The RAOs are still appropriate.

ARAR applicable or relevant and appropriate requirement
RAO remedial action objective
SARA Superfund Amendments and Reauthorization Act
TBC to be considered

Table 6-1: Review of Human Health Toxicity Data Used in Risk Assessment

Detected Analyte	MDC within LUC Area (%)	Original PRG (%)	Does MDC Exceed Original PRG?	Current PRG (%)	Current PRG Basis	Does MDC Exceed Current PRG?	Cancer Risk [a] or Noncancer HI [b] Based on Current PRG and MDC	Conclusion
Asbestos	<1	1	No	N/A	N/A	No	N/A	No further evaluation necessary

Sources: MDCs (DON 2010), original and current preliminary remediation goals (40 CFR 763.83).
% percent
HI hazard index
MDC maximum detected concentration
N/A not applicable
PRG preliminary remediation goal
[a] Cancer risk is derived from the following equation: (MDC/Current PRG) x (target risk level [10^{-6}]).
[b] Non-cancer HI is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).

SITE: Shoreline Site Northwest of Dry Dock #3 **QUESTION C: Does any other information call into question the protectiveness of the remedy?**	
Element	**Assessment**
Overall	No other information has been identified that would call into question the protectiveness of the remedy.

7. Issues, Recommendations, and Follow-up Actions

Issues identified during the site inspection and interviews are listed in Table 7-1.

Table 7-1: Issues and Recommendations for the Shoreline Site Northwest of Dry Dock #3

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Affects Protectiveness? (Y/N)	
				Current	Future
Orientation of LUC signage does not clearly indicate the LUC area boundaries.	Reposition or reword signs to more clearly indicate the extent of the LUC area.	Navy	EPA/DOH	N	Y
Vegetation growing in shoreline area may compromise shoreline protection.	Monitor vegetation as necessary to ensure shoreline protection.	Navy	EPA/DOH	N	Y
Minor cracks and holes in concrete and pavement.	Pavement should be regularly monitored and repaired as necessary to ensure that larger cracks (which could create an exposure concern) do not develop.	Navy	EPA/DOH	N	Y

8. Protectiveness Statement

The remedy at Shoreline Site Northwest of Dry Dock #3, a PHNC NPL site on Oahu, Hawaii, is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.

No changes in land use are expected in the foreseeable future.

9. References

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Attachment A: Five-Year Review Site Inspection Checklist

4th Street Coral Pit

Former Pearl City Junction

Building 6

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. "N/A" refers to "not applicable."

I. SITE INFORMATION

Site Name: Shoreline Site Northwest of Dry Dock #3	**Date of Inspection:** 23 July 2013
Location and Region: Honolulu, HI	**EPA ID:** HI4170090076
Agency, office or company leading the five-year review: NAVFAC Hawaii /AECOM	**Weather/temperature:** Overcast, mid 70s °F

Remedy Includes: (Check all that apply)
- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other – LTMM and LUCs

Attachments: ☐ Inspection team roster attached
Inspection Team Members:
Dustin Goto (AECOM)
Teresa Quiniola (AECOM)

☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** ☒ N/A
2. **O&M Staff** ☒ N/A

3. Local regulatory authorities and response agencies (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency Hawaii Department of Health

Contact Name	Title here	Date	Phone Number
Maria Reyes	Regulatory Project Mgr.	14 November 2013	808-586-4653

Agency EPA Region 9

Contact Name	Title here	Date	Phone Number
Christopher Lichens	Regulatory Project Mgr.	12 November 2013	415-972-3149

Problems, suggestions: ☒ Report attached (Refer to Attachment C)
Remarks:

4. Other interviews (optional) ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Jan Kotoshirodo, NAVFAC RPM (15 November 2013)

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1. O&M Documents Remarks: LUC Inspection documented in 2012 (DON 2012b)	☒ Readily available	☒ Up to date	☐ N/A
2. Site-Specific Health and Safety Plan	☐ Readily available	☐ Up to date	☒ N/A
3. O&M and OSHA Training Records	☐ Readily available	☐ Up to date	☒ N/A
4. Permits and Service Agreements	☐ Readily available	☐ Up to date	☒ N/A
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
7. Groundwater Monitoring Records	☐ Readily available	☐ Up to date	☒ N/A
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records	☐ Readily available	☐ Up to date	☒ N/A
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A

IV. O&M COSTS

1. O&M Organization

☐ N/A ☐ Contractor for State

☒ Other: PRP ☐ Contractor for PRP

2. O&M Cost Records

☐ Readily available ☐ Up to date

☒ Funding mechanism/agreement in place

Original O&M cost estimate N/A ☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

None

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on map ☐ Gates secure ☒ N/A

Remarks: Although the site is not fenced, the site is located within the Controlled Industrial Area of Pearl Harbor which has very strict access controls.

B. Other Access Restrictions

1. Signs and other security measures ☒ Signs ☐ N/A

Remarks: Signs are present at the north and west sides of the site; however, the signs are positioned in a way which may be misconstrued to suggest ground disturbance is only prohibited in the area between the signs and the ocean.

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Remarks:

Type of monitoring (e.g., self-reporting, drive by) Annual inspections are conducted at the Shoreline Site to visually determine the site's compliance with LUCs. The last inspection available for review was completed in September 2012.

Frequency: see above

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

Responsible party/agency NAVFAC Hawaii

Contact:

Name	Title	Date	Phone No.
Jan Kotoshirodo	RPM	12/15/2013	808-471-1171 X 341

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: Several minor surficial cracks in the concrete and asphalt are present. The area should continue to be monitored and repaired as necessary.

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: Signage could be repositioned to more specifically indicate the LUC area.

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

2. Land use changes on site ☒ N/A

3. Land use changes off site ☒ N/A

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

B. Other Site Conditions ☐ N/A

Remarks: Cracks in concrete and asphalt are likely due to weathering and age. No evidence of excavation or other construction activities were observed. The site is stabilized along the shoreline by concrete blocks, shot-crete, and curbing wall, which appeared intact and protective at the time of the site inspection. No signs of subsidence or bare soil were observed. Some vegetation is growing in the shoreline protection, but appears that it was present at the time the concrete was put in place and does not appear to be compromising the protectiveness of the controls.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

X. OTHER REMEDIES

No evidence of fiber exposure was observed. Institutional controls remain in place to prevent disturbance of the LUC area.

XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy
Shoreline protection consisting of concrete blocks, shot-crete, and curbing wall were intact and remain protective at the time of the site inspection. Although a few minor surficial cracks were observed in the asphalt paved parking area, the damage is the likely the result of vehicle usage. No signs of unauthorized excavation or other construction activities were observed. Signs are posted around the site, indicating ground disturbance activities are prohibited.
B. Adequacy of O&M
Although several cracks were noted, the paved area at the site appeared mostly intact, without significant failures that could result in exposure of underlying soil. Some vegetation is growing in the shoreline protection, but appears that it was present at the time the concrete was put in place and does not appear to be compromising the protectiveness of the controls.
C. Early Indicators of Potential Remedy Failure
None identified.
D. Opportunities for Optimization
Signage could be repositioned to more specifically indicate the LUC area. Pavement at the site should be monitored and repaired as necessary to prevent further cracks at that may expose underlying soil.

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Attachment B: Site Photographs

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Photograph No. 1: Overview of Shoreline Site Northwest of Dry Dock #3 site, looking north.

Photograph No. 2: Concrete blocks and curb protecting the site from erosion, looking southwest.

Photograph No. 3: Small shrubs observed growing in concrete. However, this did not appear to impact the erosion controls.

Photograph No. 4: View of LUC sign near shoreline, looking northeast.

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Attachment C: Interview Forms

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Building 6

INTERVIEW RECORD

Site Name: Shoreline Site Northwest of Dry Dock #3 **DOH RPM:** Maria Reyes/Wendy Ray	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 0921**	**Date: 11/14/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Maria Reyes	**Title:** Regulatory Project Manager	**Organization:** DOH-HEER

Telephone No.: 808-586-4653 **Fax No.:** — **E-Mail Address:** maria.reyes@doh.hawaii.gov	**Street Address:** 919 Ala Moana Boulevard, Rm 206 **City, State, Zip:** Honolulu, Hawaii 96814

Summary of Conversation

1. How long have you been familiar with the project site?
   April 2009, when the project was in the Draft ROD stage.
2. What is your overall impression of the project?
   This one I think the Navy did a good job on, but EPA changed their mind and said there is no safe level of asbestos so they wanted the Navy to do something different from what the Draft ROD said. I think they put concrete on top.
3. Is the remedy functioning as expected? How well is the remedy performing?
   I think the concrete cover is good to prevent exposure, but they have to make sure they fix any cracks and make sure it's in good condition.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No, none of those. DOH doesn't visit routinely; we only visit with the EPA when they schedule a visit.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   The concrete cover needs to be checked for cracks and maintained.

INTERVIEW RECORD

Site Name: Shoreline Site Northwest of Dry Dock #3 **EPA RPM:** Christopher Lichens	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1015**	**Date: 11/12/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Christopher Lichens	**Title:** Regulatory Project Manager	**Organization:** EPA

Telephone No.: 415-972-3149 **Fax No.:** **E-Mail Address:** lichens.christopher@ epa.gov	**Street Address:** 75 Hawthorne Street **City, State, Zip:** San Francisco, CA 94105

Summary of Conversation

1. How long have you been familiar with the project site?
   About 4 years.
2. What is your overall impression of the project?
   As far as I know, it's going fine.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   No.

INTERVIEW RECORD

Site Name: Shoreline Site Northwest of Dry Dock #3 **Navy RPM:** Jan Kotoshirodo	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1013**	**Date: 11/15/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Jan Kotoshirodo	**Title:** Remedial Project Manager	**Organization:** Navy
Telephone No.: 808-471-1171 ext. 341 **Fax No.:** — **E-Mail Address:** jan.kotoshirodo@navy.mil	**Street Address:** 400 Marshall Road **City, State, Zip:** JBPHH, HI 96860-3139	

Summary of Conversation

1. How long have you been familiar with the project site?
   Since 2008.
2. What is your overall impression of the project?
   I think we accomplished the implementation of the remedy and we're in the phase of managing the LUCs.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities, including LUC inspections.
   No.
6. Have there been unexpected costs or difficulties at the site in the last five years (or since the ROD was signed? Please provide details.
   No.
7. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.
8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   No.
9. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
10. Do you have any comments, suggestions, or recommendations regarding the project?
    No.

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4th Street Coral Pit

ATTACHMENTS

FIGURE

TABLES

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
DOH	Department of Health, State of Hawaii
EPA	Environmental Protection Agency, United States
HHRA	human health risk assessment
HI	hazard index
JBPHH	Joint Base Pearl Harbor-Hickam
LUC	land use control
MCL	maximum contaminant level
MDC	maximum detected concentration
mg/kg	milligram per kilogram
mg/L	milligram per liter
msl	mean sea level
NAVFAC	Naval Facilities Engineering Command
NPL	National Priorities List
O&M	operation and maintenance
PA	preliminary assessment
PHNC	Pearl Harbor Naval Complex
RAB	Restoration Advisory Board
RAO	remedial action objective
RI	remedial investigation
ROD	record of decision
RPM	remedial project manager
RSL	regional screening level
SI	site inspection
U.S.	United States
VOC	volatile organic compound

1. Site Chronology

The 4th Street Coral Pit is a land use control (LUC) site in the Pearl Harbor Naval Complex (PHNC), National Priorities List (NPL) sites at Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii. Significant events relevant to this site are presented in Table 1-1.

Table 1-1: 4th Street Coral Pit Site Chronology of Events

Event	Date of Event
The Coral Pit was excavated as a source of coral for use as road construction material (NEESA 1983).	1930s
During World War II the Coral Pit was used as a waste disposal site for solvent cans, paint sludges, paint cans, empty transformers, acid-filled automotive batteries, and dunnage (NEESA 1983).	1940s
The Coral Pit was partially backfilled with coral rock (NEESA 1983).	Mid-1970s
An initial assessment study concluded that the small quantities of waste reportedly disposed of at the site were insignificant and no confirmation study was recommended (NEESA 1983).	1981
A preliminary assessment conducted by the Navy concluded that further investigation was required to assess whether contaminants attributable to the Coral Pit wastes may have migrated through the coral and into the groundwater (DON 1985).	1985
A site inspection was conducted for the Coral Pit and results indicated that all contaminant levels were below those requiring a response action and no further action was recommended (HLA 1990).	1989
A site summary report determined that it may be appropriate to implement groundwater monitoring and land use controls (i.e., institutional controls) in accordance with appropriate regulations to ensure that site risks remain at acceptable levels (Earth Tech 2002).	2002
A proposed plan was prepared to formally present the selected remedy for the 4th Street Coral Pit to the public and to solicit public comments (DON 2012).	2012
A remedial investigation found arsenic detected above residential and industrial screening levels at all 56 surface soil sampling locations (except one location, which exceeded only residential screening levels) across the site. Therefore, arsenic was identified as the primary chemical of concern at the 4th Street Coral Pit (AECOM 2011).	2009–2010
A feasibility study was performed to address the former solid waste disposal area and chemical of concern at the 4th Street Coral Pit using the presumptive remedy approach. Land use controls were selected as the final remedy for the 4th Street Coral Pit (AECOM 2012).	2012
A pre-final ROD was prepared to identify land use controls using the presumptive remedy approach as the final remedy for the 4th Street Coral Pit (DON 2013).	2013

2. Background

2.1 SITE DESCRIPTION

The site is located at the JBPHH, West Loch Annex, Oahu, Hawaii. The site is part of the PHNC NPL Site under the United States (U.S.) Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System number HI4170090076. The 4th Street Coral Pit is a former disposal area located between 4th Street and 3rd Street and is approximately 1,000 feet long by 250 feet wide (Figure 1). Site debris and disturbed soil extend to an approximate average depth of 12 feet below ground surface (bgs) and the total volume of disposed material is estimated to be approximately 101,000 cubic yards. The site is located within a harbor-front Navy munitions handling facility that is surrounded by a security fence on all sides. Authorized entry to the site is gained only by passing through a series of two guarded gates; access to the 4th Street side of the Coral Pit is further restricted by a locked gate. The Coral Pit is near West Loch ammunition handling wharves and therefore, has restricted access and restricted land use.

Historical information indicates that the 4th Street Coral Pit was used as a waste disposal site for solvent cans, paint sludges, paint cans, empty transformers, acid-filled automotive batteries, and dunnage. The type of waste observed at the 4th Street Coral Pit during the remedial investigation (RI) predominantly included scrap metal, construction debris, wood waste, and other inert or non-hazardous waste. As a former solid waste disposal area, the 4th Street Coral Pit has similar characteristics to a landfill and has potential for low-level, long-term exposure. Therefore, the 4th Street Coral Pit meets the criteria as described in the Presumptive Remedy for CERCLA Municipal Landfill Sites (EPA 1993), which states that municipal landfill sites typically contain a combination of principally municipal and to a lesser extent hazardous wastes. The presumptive remedy is intended to provide containment of the solid waste and any potential residual effects from the source material (solid waste) and byproducts such as landfill gas (i.e., methane), leachate, and impacted groundwater. Because landfill gas and leachate are not present at the site and groundwater has not been impacted above screening levels (except for background metals), no containment or monitoring is required for these media to ensure that risks to human and ecological receptors remain within acceptable levels (DON 2013).

Currently, the ground surface at the 4th Street Coral Pit is approximately 3 to 7 feet below the surrounding grade. The site is considered an industrial site and the groundwater beneath the site is not a current or potential future source of drinking water (Earth Tech 2007). Ground cover is mainly kiawe forest and grasses, though scrap metal and other debris are visible at the surface.

2.2 PHYSICAL CHARACTERISTICS

2.2.1 Topography

Topography of the JBPHH, West Loch Annex is characterized by flat coastal plains, with ground surface elevations ranging from a maximum of 40 feet above mean sea level (msl) at the north end of the installation to less than 10 feet above msl on the southern boundary. The ground surface within the immediate investigation area is variable. At the southern boundary of the 4th Street Coral Pit, the ground surface slopes steeply downward toward the interior of the site, then continues to slope gently to the lowest portion of the site, approximately 3 to 7 feet below the surrounding grade. The interior of the 4th Street Coral Pit consists of depressions, cracks, and elevated features containing waste and fill material. The grade is generally higher in the northern end of the 4th Street Coral Pit. Large pieces of scrap metal and construction debris are visible at the surface throughout the 4th Street Coral Pit.

2.2.2 Geology and Soils

JBPHH, West Loch Annex is located on the Ewa coastal plain of southern Oahu. The coastal plain deposits consist of interbedded coralline limestone and terrestrial and marine sediments, which extend down to the Koolau basaltic bedrock at approximately 700 feet bgs (Dale 1967). This sequence of materials is locally known as caprock (Visher and Mink 1964). Interbedding of the various caprock deposits is complex and has not been defined in detail. The coralline limestone typically consists of a wide range of carbonate materials that vary dramatically depending on the original depositional environment. This limestone reaches its maximum thickness near the coastline, and decreases in thickness with increasing distance inland from the shore. Native rock observed at the 4th Street Coral Pit is representative of the upper coastal caprock formation, and consists primarily of limestone sand and coralline limestone. The thickness of the limestone unit varies from 0 to 28.5 feet (HLA 1990).

Soils found at JBPHH, West Loch Annex include silts, clays, plastic clays, coral, and fill material. Surface soils at the 4th Street Coral Pit consist mainly of silt, sandy silt, and gravely silt fill material (HLA 1990). Soils on the Ewa Plain are derived primarily from coralline limestone. Artificial fill material is also commonly encountered at the JBPHH, West Loch Annex and is primarily associated with construction activities.

2.2.3 Groundwater Hydrology

Groundwater beneath JBPHH, West Loch Annex occurs in two recognized regional systems: a deeper basaltic aquifer (basal aquifer) and a shallower water table aquifer in the caprock formation. Recharge of the basal aquifer is derived from underflow from the Koolau Range. The principal sources of recharge for the caprock aquifer are return irrigation water, direct infiltration of precipitation, and leakage from the underlying basal aquifer. The low-permeability strata within the coastal plain caprock formation can confine the basal groundwater, resulting in artesian hydraulic head conditions (Earth Tech 2007).

The near-surface groundwater within the caprock beneath the 4th Street Coral Pit is classified as a Category II, Non-Potable as discussed in the document *Final Classification of Shallow Caprock Groundwater at Navy Oahu Facilities, Oahu, Hawaii* (Earth Tech 2007). The groundwater beneath the site is not used for drinking water supply due to its high salinity, likelihood of seawater intrusion if pumped, and because the site is located in an area where wastewater injection is permitted by the State of Hawaii Department of Health (DOH) underground injection control program (Earth Tech 2007). Groundwater at the site typically occurs at a depth of 17 feet bgs.

2.3 LAND USE

Currently, the 4th Street Coral Pit is undeveloped and none of the magazines surrounding the site are currently in use. Access to the area and land use at JBPHH, West Loch Annex is restricted. The site is considered a commercial/industrial site. The site is restricted to industrial use only and the development and use of this area for recreational purposes, residential housing, schools, child care centers, or playgrounds is prohibited. The 4th Street Coral Pit is expected to remain a vacant and unused closed disposal area.

2.4 HISTORY OF CONTAMINATION

In the 1930s, the site was excavated as a source of coral for use as road construction materials. During World War II, the coral pit was used as a waste disposal site for solvent cans, paint sludges, paint cans, empty transformers, acid-filled automotive batteries, and dunnage (NEESA 1983). The coral pit was partially backfilled with coral rock by the U.S. Army Corps of Engineers in the mid-1970s to preclude further disposal of potentially hazardous materials. At that time, the coral pit was still 12 feet deep (NEESA 1983). Subsequent to covering the coral pit, scrap metal disposal was permitted at the site, although unauthorized disposal of other materials reportedly continued (NEESA 1983). The site remained undeveloped after its closure, and the current surface of the 4th Street Coral Pit remains approximately 3 to 7 feet below the surrounding grade.

2.5 Initial Response

The Navy conducted a preliminary assessment (PA) of the site in 1985. The PA concluded that further investigation was required to assess whether contaminants associated with materials that were historically deposited in the coral pit may have migrated through the coral and into groundwater (DON 1985).

A site inspection (SI) was conducted in 1989 (HLA 1990) to collect data to characterize the nature and extent of groundwater contamination at the site. Seven groundwater monitoring wells were installed at the site between June 1988 and April 1989. The groundwater samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds, and priority pollutant metals. The groundwater data indicated that arsenic, cadmium, copper, lead, selenium, zinc, benzene, and toluene were detected; however, cadmium was the only analyte detected in groundwater at concentrations above 1989 screening criteria (maximum contaminant levels [MCLs]) (EPA 2003). Cadmium was detected in groundwater at a concentration of 0.078 milligram per liter (mg/L), which exceeded the 1989 MCL (0.01 mg/L) in effect at that time (HLA 1990).

Subsequent to the 1989 SI, a review of the site conducted for a 2002 site summary report (Earth Tech 2002) suggested that it may be appropriate to implement groundwater monitoring and LUCs consisting of institutional controls to ensure that the site risks remain within acceptable levels.

A RI was performed between November 2009 and June 2010. Over 150 soil, ambient air, soil gas, and groundwater samples were collected from the site to evaluate the nature and extent of contamination, and to support the baseline human health risk assessment (HHRA) and ecological screening risk assessment. Based on historical records and the excavation of test pits, waste deposited in the coral pit were found to be present at depths of 5 to 13.5 feet below the current surface of the coral pit, which is well above groundwater in the area (at approximately 17 feet bgs). VOCs were not detected in groundwater and disposal of wastes in the coral pit generally ceased nearly 40 years ago (the mid-1970s). Therefore, it was concluded that any contaminants from potential source materials still present in the coral pit would be expected to have already impacted groundwater. Since groundwater is not impacted, it suggests that no source material is present at the water table and that contaminants are not leaching into groundwater from the source material above the water table. The vast majority of waste in the coral pit was found to be construction debris, predominantly concrete and asphalt pavement that generally does not have an affinity for generating a contaminant plume. Due to the length of time that the waste has been in the coral pit, it was inferred that the currently observed groundwater parameters are stable and representative of equilibrium conditions.

2.6 Basis for Taking Remedial Action

The HHRA results calculated as part of the RI indicated the potential incremental lifetime cancer risk for the industrial worker at the site is 2E–05, which is within the EPA target cancer risk range of 10^{-6} to 10^{-4}. The majority of this cancer risk is due to the presence of arsenic, which was detected above residential and industrial screening levels at all 56 surface soil sampling locations (except one location, which exceeded only residential screening levels) and ranged from 1.3 to 47.7 milligrams per kilogram. The total soil hazard index (HI) for the industrial worker of 0.26 is also within the acceptable range (i.e., below the EPA target HI of 1). The results of the Tier 2, Step 3a baseline ecological risk assessment indicated that the potential risk to ecological receptors from exposure to onsite soils and groundwater is acceptable and no further action is necessary at the site.

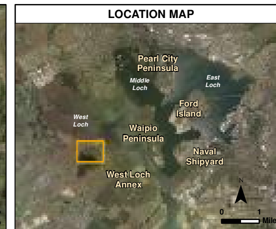
Previous site investigations and risk assessment calculations identified arsenic as the chemical of concern for the 4th Street Coral Pit (Table 2-1). The results were documented in the pre-final record of decision (ROD) (DON 2013).

Table 2-1: Chemical of Concern for the 4th Street Coral Pit

COC	MDC (mg/kg)	DOH EAL (mg/kg)	EPA Residential RSL (mg/kg)	EPA Industrial RSL (mg/kg)	95th percentile Background Value (mg/kg)
Arsenic	47.7	20	0.39	1.6	7.2

Sources: DOH Tier 1 EALs (DOH 2011), EPA RSLs (EPA 2013), and Background levels (Earth Tech 2006).
COC chemical of concern
EAL environmental action level
MDC maximum detected concentration
mg/kg milligram per kilogram
RSL regional screening level

LOCATION MAP



LEGEND

(yellow outline)	Approximate LUC Boundary
(grey line)	Street

NOTES

1. Map Projection: UTM NAD 83 Zone 4
2. Base Map Orthophoto: Earth Data, USGS Hawaii Data Clearinghouse.

N

0 125 250 500 Feet

Figure 1
4th Street Coral Pit Site Location Map
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

P:\ENV\Federal\NAVY\CLEAN_LANTDIV\CTO KB12\900 CAD-GIS\02_MXD\Site Location Maps\Fig 1 - 4th St Coral Pit Site Location Map.mxd

3. Remedial Actions

The pre-final ROD (DON 2013) addresses surface soil contamination and specifies the presumptive remedy, including LUCs, as the final remedy for the 4th Street Coral Pit. Although the signed ROD was not available at the date of publication of this draft First Five-Year CERCLA Review, it is anticipated that the final ROD will be signed prior to the completion of the overall review process.

3.1 Remedial Action Objectives

The principal remedial action objectives (RAOs) to address the onsite waste as well as metals in surface soil for the 4th Street Coral Pit are as follows:

- Minimize human exposure to metals (arsenic) in surface soil on site through dermal adsorption, incidental ingestion, and inhalation.
- Ensure that waste and contamination in surface soil remain on site and that excavation, construction, and soil removal do not occur without proper handling and disposal.

Industrial and commercial land uses are the reasonably anticipated land uses for the 4th Street Coral Pit for the foreseeable future.

The RAO will be achieved by containment of contaminants and long-term management of the site with LUCs. LUCs will limit future exposure to contaminated soil and debris.

3.2 Remedy Description

The selected final remedy for the 4th Street Coral Pit includes implementation and maintenance of LUCs. The elements of the selected final remedy include the following:

- LUCs
- Annual inspections and maintenance (as required)
- Five-year reviews

3.3 Remedy Implementation

Since the ROD for the 4th Street Coral Pit has not been signed, the remedy has not been implemented.

3.4 Systems Operations and Maintenance

Except for compliance monitoring, the 4th Street Coral Pit will not have active remedial systems.

Annual LUC inspections are expected to be conducted once the ROD is signed, as well as five-year reviews of the site. According to the site remedial project manager (RPM), no significant cost variances indicative of potential problems were identified with regards to the planned operation and maintenance (O&M) costs.

4. Progress Since the Last Five-Year Review

This is the first five-year review for the 4th Street Coral Pit, a PHNC NPL site on Oahu, Hawaii. Consequently, there is no new progress to report since the previous five-year review for the 4th Street Coral Pit.

5. Five-Year Review Process

5.1 Administrative Components

The public was notified of the initiation of this five-year review in July 2013. The five-year review team members are listed in Table 5-1.

Table 5-1: Five-Year Review Team Members

DOH	Regulatory Project Manager: Maria Reyes/Wendy Ray
Navy	RPM for five-year review: Jan Kotoshirodo
	RPM for specific site: Joel Narusawa
EPA	Regulatory Project Manager: Christopher Lichens
AECOM	Project Manager: Dean Baxley
	Deputy Project Manager: Teresa Quiniola
	Project Support: Dustin Goto, Andrea VonBurg Hall

AECOM AECOM Technical Services, Inc.

The team members established a review schedule extending from May to December 2013, during which they performed community involvement activities related to the current five-year review, reviewed relevant documents and data, inspected the site, and interviewed the site project manager and regulators.

5.2 Document Review

This five-year review consists of a review of relevant documents including O&M records, the pre-final ROD, RIs, feasibility studies, risk assessments, work plans, remedial designs, completion reports, long-term monitoring and operation reports, LUC inspection reports, monitoring data, and various compliance reports. The list of documents reviewed is provided in Section 9. Applicable cleanup standards, as listed in the pre-final ROD, were reviewed. However, no changes were identified.

5.3 Data Review

No data for the site has been collected since the pre-final ROD was published in 2013.

5.4 Site Inspection

A five-year review site inspection at 4th Street Coral Pit was conducted on 24 July 2013 to assess the operations and effectiveness of LUCs at the site. During the site visit, the weather was sunny and the temperature averaged 80 degrees Fahrenheit. As observations were made, a five-year review site inspection checklist was completed to document the status of the site (Attachment A).

No significant issues were identified regarding the 4th Street Coral Pit LUC area. The site is located within a vegetated area between 3rd and 4th Streets. Vehicular traffic on either road adjoining the LUC area is restricted by locked gates. Signage is also present, which notes the area is a “controlled” and “restricted” area.

At the time of the site inspection, the LUC area consisted of dry grass, kiawe, and haole koa trees. The dry vegetation was likely due to limited precipitation in the West Loch area. Evidence of vegetation clearance and ground disturbance during previously conducted RI activities were still visible; however, no other signs of construction or other activities were observed.

Two aboveground monitoring well heads were observed during the site inspection. Both wells appeared to be in good condition and were secured with locks.

Photographs from the site visit are presented in Attachment B.

5.5 INTERVIEWS

Interviews were conducted with the following personnel:

Name	Affiliation	Date
Maria Reyes	DOH, Regulatory Project Manager	14 November 2013
Christopher Lichens	EPA, Regulatory Project Manager	12 November 2013
Joel Narusawa	NAVFAC Hawaii, RPM	6 January 2014

NAVFAC Naval Facilities Engineering Command

The EPA regulatory project manager and Naval Facilities Engineering Command, Hawaii RPM indicated that once the remedy is in place, it should perform as expected. However, since the ROD has not been signed, the remedy has not yet been implemented. The DOH regulatory project manager indicated that she was unfamiliar with the project and therefore, provided no information regarding the site except that no complaints or community concerns had been received.

Interview forms are presented in Attachment C.

6. Technical Assessment

Answers to the following three key technical questions are presented in tabular format below:

- A: Is the remedy functioning as intended by the decision documents?
- B: Are the assumptions used at the time of remedy selection still valid?
- C: Does any other information call into question the protectiveness of the remedy?

A review of the conceptual site model for the 4th Street Coral Pit indicated that no significant changes to land use or site conditions were identified that would affect the remedy effectiveness.

SITE: 4TH STREET CORAL PIT
QUESTION A: Is the remedy functioning as intended by the decision documents?

Element	Assessment
Remedial Action Performance	The proposed remedy at the 4th Street Coral Pit is LUCs. LUCs are the non-technical and non-engineering actions that will help mitigate potential risks to human health and the environment by restricting access to contaminated soil. No evidence of soil disturbance was observed during the site visit.
System Operations/O&M	No active systems or monitoring is currently in place at the 4th Street Coral Pit.
Cost of Systems Operations/O&M	No cost variances were identified that suggest the remedy is not properly functioning.
Opportunities for Optimization	No opportunities for optimization were identified for the 4th Street Coral Pit.
Early Indicators of Potential Remedy Failure	The remedy is expected to function as intended. No early indicators of issues with implementing the proposed remedy were noted in the review, except that LUC warning signs have not been installed as of the date of this report.
Implementation of Institutional Controls and Other Measures	Signage and gates are present at the entrances to 3rd and 4th Streets to prevent unauthorized access into the area where the 4th Street Coral Pit is located. However, site-specific LUC warning signs had not been installed as of the date of this report. The site is located within JBPHH, West Loch Annex, a secure facility that restricts and vigorously enforces entry. Administrative processes and procedures are in place that require approval for all projects involving construction or digging and subsurface disturbance. These procedures involve coordination and approval by NAVFAC Hawaii environmental personnel for projects located in or near an environmental restoration site, to include sites that have LUCs. The Navy will ensure these or similar processes and procedures remain in place and are complied with for all proposed construction, digging, and subsurface soil disturbing activities.

SITE: 4TH STREET CORAL PIT QUESTION B: Are the assumptions used at the time of remedy selection still valid?	
Element	**Assessment**
Changes in Standards and TBC Requirements	Regulatory requirements were considered in the selection of the final remedy. The changes to Standards and TBC requirements will be evaluated when the ROD is signed. However, changes to screening levels are discussed under Changes in Toxicity and Other Contaminant Characteristics below.
Changes in Exposure Pathways and Land Use	The land use designation for the 4th Street Coral Pit is commercial/industrial. The site is vacant and part of a secure Navy facility with limited access. No change in land use is anticipated for the foreseeable future. The 4th Street Coral Pit is expected to remain a vacant and unused closed disposal area. No changes in land use or exposure pathways were identified at the time of the site visit.
Changes in Toxicity and Other Contaminant Characteristics	Table 6-1 compares the PRGs (2010 EPA RSLs) used in re-evaluating the original risk estimates with the May 2013 EPA RSLs (EPA 2013). With the exception of thallium, mercury, acenaphthylene, 2-methylnaphthalene, and phenanthrene, the May 2013 RSLs for each of the COCs are equal to the previous PRGs (EPA 2013). The MDCs within the LUC area exceed established background levels for antimony, arsenic, cadmium, chromium, copper, lead, nickel, and zinc. However, only arsenic exceeds both the May 2013 RSLs and background concentrations. All other COCs are below screening criteria. The May 2013 RSLs for the industrial worker are based on a 10^{-6} cancer risk. The potential ILCR estimated for the industrial receptor in the re-evaluation is 3E–05 based on the MDC, which is within the risk management range of 10^{-6} to 10^{-4}. Remedial actions include implementation of LUCs that are protective of the industrial worker. Therefore, the changes to the RSLs do not affect the RAOs that limit use of the site to industrial use. Thus, it is not necessary to update the standards used at the time of remedy selection.
Changes in Risk Assessment Methodologies	Changes in risk assessment methodologies since the RI was prepared include changes in the estimation of risk from exposure to chemicals via inhalation, and the consideration of the mutagenic mode of action with regard to child receptors. Active soil gas samples and ambient air samples were collected within the 4th Street Coral Pit during the RI. However, no landfill gases were found and the ROD indicated that no further monitoring for landfill gas, leachate, or groundwater was necessary for the site (AECOM 2013). Therefore, these changes do not call into question the protectiveness of the remedy for the 4th Street Coral Pit based on the HHRA results for the estimated exposure to an industrial worker as documented in the RI/FS and pre-final ROD. In addition, no landfill gases were found during the RI.
Remedy Byproducts	No remedy byproducts have been identified to consider in this assessment.
New Contaminants and Contaminant Sources	No new contaminants or contaminant sources have been identified.
Expected Progress Toward Meeting RAOs	Exposure assumptions, toxicity data, cleanup levels, and RAOs remain valid for the selected remedy. However, the remedy has not yet been implemented.

FS feasibility study
ILCR incremental lifetime cancer risk
PRG preliminary remediation goal
TBC to be considered

Table 6-1: 4th Street Coral Pit Review of Human Health Toxicity Data Used in Risk Assessment

Detected Analyte	MDC within LUC Area (mg/kg)	Original 2010 Industrial PRG (mg/kg)	Does MDC Exceed Original PRG?	2013 (May) Industrial PRG (mg/kg)	2013 Industrial PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Industrial Non-cancer HI [b] Based on Current PRG and MDC	Conclusion
COC											
Arsenic	47.7	1.6	Yes	2.4	Cancer	Yes	7.2	Yes	2.0E–05	NA	MDC still exceeds PRG and background. However, current risk is within acceptable cancer risk range of 10^{-6} to 10^{-4}.
Detected COPCs											
Antimony	3.7	410	No	410	Noncancer	No	3.4	Yes	NA	9.0E–03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Beryllium	1.2	2,000	No	2,000	Noncancer	No	1.7	No	NA	6.0E–04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Cadmium	2	800	No	800	Noncancer	No	1.7	Yes	NA	2.5E–03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Chromium	169	1,500,000	No	1,500,000	Noncancer	No	65	Yes	NA	1.1E–04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Copper	255	41,000	No	41,000	Noncancer	No	37	Yes	NA	6.2E–03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Lead	402	800	No	800	Noncancer	No	24	Yes	NA	5.0E–01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Nickel	155	20,000	No	20,000	Noncancer	No	44	Yes	NA	7.8E–03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Selenium	1.8	5,100	No	5,100	Noncancer	No	3.3	No	NA	3.5E–04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Detected Analyte	MDC within LUC Area (mg/kg)	Original 2010 Industrial PRG (mg/kg)	Does MDC Exceed Original PRG?	2013 (May) Industrial PRG (mg/kg)	2013 Industrial PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Industrial Non-cancer HI [b] Based on Current PRG and MDC	Conclusion
Silver	0.89	5,100	No	5,100	Noncancer	No	3.6	No	NA	1.7E–04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Thallium	0.24	1	No	10	Noncancer	No	1.2	No	NA	2.4E–02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Zinc	1580	310,000	No	310,000	Noncancer	No	52	Yes	NA	5.1E–03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Mercury	0.6	34	No	43	Noncancer	No	NA	NA	NA	1.4E–02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
TPH-DRO (C10-C24) [c]	100	500	No	1,000	Noncancer	No	NA	NA	NA	1.0E–01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
TPH-RRO (C24-C36) [c]	650	500	Yes	120,000	Noncancer	No	NA	NA	NA	5.4E–03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Aroclor 1260	0.16	0.74	No	0.74	Cancer	No	NA	NA	2.2E–07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Polychlorinated biphenyls	0.16	0.74	No	0.74	Cancer	No	NA	NA	2.2E–07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Acenaphthene	0.011	33,000	No	33,000	Noncancer	No	NA	NA	NA	3.3E–07	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Acenaphthylene [d]	0.021	130	No	11,000	Noncancer	No	NA	NA	NA	1.9E–06	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Detected Analyte	MDC within LUC Area (mg/kg)	Original 2010 Industrial PRG (mg/kg)	Does MDC Exceed Original PRG?	2013 (May) Industrial PRG (mg/kg)	2013 Industrial PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Industrial Non-cancer HI [b] Based on Current PRG and MDC	Conclusion
Anthracene	0.069	170,000	No	170,000	Noncancer	No	NA	NA	NA	4.1E–07	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Benzo(a)anthracene	0.21	2.1	No	2.1	Cancer	No	NA	NA	1.0E–07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Benzo(a)pyrene	0.11	0.21	No	0.21	Cancer	No	NA	NA	5.2E–07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Benzo(b)fluoranthene	0.33	2.1	No	2.1	Cancer	No	NA	NA	1.6E–07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Benzo(g,h,i)perylene [e]	0.044	27	No	22,000	Noncancer	No	NA	NA	NA	2.0E–06	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Benzo(k)fluoranthene	0.35	21	No	21	Cancer	No	NA	NA	1.7E–08	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Fluoranthene	0.73	22,000	No	22,000	Noncancer	No	NA	NA	NA	3.3E–05	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Pyrene	0.88	1,700	No	1,700	Noncancer	No	NA	NA	NA	5.2E–04	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
2-Methylnaphthalene	0.0068	4,100	No	2,200	Noncancer	No	NA	NA	NA	3.1E–06	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Chrysene	0.35	210	No	210	Cancer	No	NA	NA	1.7E–09	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Detected Analyte	MDC within LUC Area (mg/kg)	Original 2010 Industrial PRG (mg/kg)	Does MDC Exceed Original PRG?	2013 (May) Industrial PRG (mg/kg)	2013 Industrial PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Industrial Non-cancer HI [b] Based on Current PRG and MDC	Conclusion
Dibenzo(a,h)anthracene	0.03	0.21	No	0.21	Cancer	No	NA	NA	1.4E–07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Fluorene	0.013	22,000	No	22,000	Noncancer	No	NA	NA	NA	5.9E–07	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Indeno(1,2,3-cd)pyrene	0.04	2.1	No	2.1	Cancer	No	NA	NA	1.9E–08	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Naphthalene	0.0079	18	No	18	Cancer	No	NA	NA	4.4E–10	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Phenanthrene [f]	0.15	18	No	21,000	Noncancer	No	NA	NA	NA	7.1E–06	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Sources: MDCs (AECOM 2011), Original PRGs (EPA 2010), PRGs (EPA 2013), EALs (DOH 2011).

COPC chemical of potential concern
DRO diesel range organics
NA not available
RRO residual range organics
TPH total petroleum hydrocarbons

[a] Industrial cancer risk is derived using the following equation: (MDC/Current PRG) x (target risk level [10^{-6}]).
[b] Industrial non-cancer HI is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).
[c] EPA does not have a PRG for DRO/RRO; value used is DOH EAL (DOH 2011; Table I-2).
[d] EPA does not have a PRG for acenaphthylene; value used is DOH EAL (DOH 2011, Table I-2).
[e] EPA does not have a PRG for benzo(g,h,i)perylene; value used is DOH EAL (DOH 2011, Table I-2).
[f] EPA does not have a PRG for phenanthrene; value used is DOH EAL (DOH 2011, Table I-2).

SITE: 4TH STREET CORAL PIT **QUESTION C: Does any other information call into question the protectiveness of the remedy?**	
Element	**Assessment**
Overall	No other information has been identified that would call into question the protectiveness of the proposed remedy.

7. Issues, Recommendations, and Follow-up Actions

Issues identified during the site inspection and interviews are listed in Table 7-1.

Table 7-1: Issues and Recommendations for the 4th Street Coral Pit

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Affects Protectiveness? (Y/N)	
				Current	Future
The ROD has not been finalized and the remedy has not been implemented, including LUCs and signage.	Once the ROD has been signed, the LUCs should be implemented. LUC signage should be installed to specifically warn of contaminated soil and prohibit unauthorized digging.	Navy	EPA/DOH	N	Y

8. Protectiveness Statement

A protectiveness determination of the remedy at the 4th Street Coral Pit, a PHNC NPL site on Oahu, Hawaii, will be deferred until the remedy is implemented. It is expected that the ROD will be signed in late 2014, at which time a protectiveness determination will be made.

9. References

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First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Attachment A: Five-Year Review Site Inspection Checklist

Former Pearl City Junction

Building 6

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. “N/A” refers to “not applicable.”

I. SITE INFORMATION	
Site Name: 4th Street Coral Pit	**Date of Inspection:** July 24, 2013
Location and Region: Honolulu, HI	**EPA ID:** HI4170090076
Agency, office or company leading the five-year review: NAVFAC Hawaii /AECOM	**Weather/temperature:** Sunny, 80 °F
Remedy Includes: (Check all that apply) ☒ Landfill cover/containment ☒ Access controls ☒ Institutional controls ☐ Groundwater pump and treatment ☐ Surface water collection and treatment ☒ Other – LTMM and LUCs	
Attachments: ☐ Inspection team roster attached Inspection Team Members: Dustin Goto (AECOM) Teresa Quiniola (AECOM)	☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** ☒ N/A
2. **O&M Staff** ☒ N/A

3. Local regulatory authorities and response agencies (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency <u>Hawaii Department of Health</u>

Contact	Name	Title here	Date	Phone Number
	Maria Reyes	Regulatory Project Mgr.	14 November 2013	808-586-4653

Agency <u>EPA Region 9</u>

Contact	Name	Title here	Date	Phone Number
	Christopher Lichens	Regulatory Project Mgr.	12 November 2013	415-972-3149

Problems, suggestions: ☒ Report attached to Five-Year Review Report (Refer to Attachment C)
Remarks:

4. Other interviews (optional) ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Joel Narusawa, NAVFAC RPM

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1. O&M Documents	☐ Readily available	☐ Up to date	☒ N/A
2. Site-Specific Health and Safety Plan	☐ Readily available	☐ Up to date	☒ N/A

III. ONSITE DOCUMENTS & RECORDS VERIFIED (cont'd)			
3. O&M and OSHA Training Records	☐ Readily available	☐ Up to date	☒ N/A
4. Permits and Service Agreements	☐ Readily available	☐ Up to date	☒ N/A
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
7. Groundwater Monitoring Records	☒ Readily available	☐ Up to date	☐ N/A
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records	☐ Readily available	☐ Up to date	☒ N/A
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A

IV. O&M COSTS

1. O&M Organization

☐ N/A ☐ Contractor for State
☐ Other ☒ Contractor for PRP

2. O&M Cost Records

☐ Readily available ☐ Up to date
☒ Funding mechanism/agreement in place
Original O&M cost estimate N/A ☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

None

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on map ☐ Gates secure ☒ N/A

B. Other Access Restrictions

1. Signs and other security measures ☒ Signs ☐ N/A

Remarks: Signs are posted at the ends of 3rd and 4th Streets, indicating the site is a "restricted" and "controlled" area. Site is located in a highly controlled, secured area due to munitions storage in the vicinity. However, site-specific LUC signage was not installed at the time of this review.

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	☒ No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	☒ No	☐ N/A

Remarks: No evidence of unauthorized ground disturbance is present.
Type of monitoring (e.g., self-reporting, drive by) No regular monitoring is performed.
Frequency: n/a
Responsible party/agency NAVFAC Hawaii
Contact

Name	Title	Date	Phone No.
Joel Narusawa	RPM	01/09/2014	808-471-1171 X 222

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

Reporting is up-to-date	☐ Yes	☐ No	☒ N/A
Reports are verified by the lead agency	☐ Yes	☐ No	☒ N/A

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A

Remarks: ROD has not been signed and therefore the remedy has not been implemented.

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: Dry vegetation was observed throughout the site.

2. Adequacy ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

Remarks: Remedy has not been implemented.

D. General

1. Vandalism/trespassing	☐ Location shown on site map	☒ No vandalism evident
2. Land use changes on site	☒ N/A	
3. Land use changes off site	☒ N/A	

VI. GENERAL SITE CONDITIONS

A. Roads	☐ Applicable	☒ N/A
B. Other Site Conditions		☒ N/A

Remarks: 3rd and 4th Streets provide access to the site; however, they are not included in the LUC area.

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. Settlement (Low spots)	☐ Location shown on site map	☒ Settlement not evident
2. Cracks	☐ Location shown on site map	☒ Cracking not evident
3. Erosion	☐ Location shown on site map	☒ Erosion not evident
4. Holes	☐ Location shown on site map	☒ Holes not evident

5. Vegetative Cover ☒ Grass ☐ Cover properly established ☐ No signs of stress
☒ Trees/Shrubs

Remarks: Most vegetation at the site appears dry, but is likely due to a lack of precipitation and still appears to keep the soil cover from eroding.

6. Alternative Cover (armored rock, concrete, etc.) ☒ N/A

7. Bulges	☐ Location shown on site map	☒ Bulges not evident
8. Wet Areas/Water Damage	☒ Wet areas/water damage not evident	
9. Slope Instability ☐ Slides	☐ Location shown on site map	☒ No evidence of slope instability
B. Benches	☐ Applicable	☒ N/A
C. Letdown Channels	☐ Applicable	☒ N/A

VII. LANDFILL COVERS (cont'd)			
D. Cover Penetrations	☒ Applicable	☒ N/A	
1. Gas Vents	☐ Active	☐ Passive	☒ N/A
☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
☐ Evidence of leakage at penetration		☐ Needs maintenance	
Remarks:			
2. Gas Monitoring Probes		☐ Applicable	☒ N/A
☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
☐ Evidence of leakage at penetration		☐ Needs maintenance	
Remarks:			
3. Monitoring Wells (within surface area of landfill)			
☒ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
☐ Evidence of leakage at penetration		☐ Needs O&M	☐ N/A
Remarks: Monitoring wells that were observed were secured with a lock.			
4. Leachate Extraction Wells			☒ N/A
5. Settlement Monuments	☐ Located	☐ Routinely surveyed	☒ N/A
E. Gas Collection and Treatment		☐ Applicable	☒ N/A
F. Cover Drainage Layer		☐ Applicable	☒ N/A
G. Detention/Sedimentation Ponds		☐ Applicable	☒ N/A
H. Retaining Walls	☐ Applicable	☒ N/A	
I. Perimeter Ditches/Off-Site Discharge		☐ Applicable	☒ N/A

VIII. VERTICAL BARRIER WALLS	☐ Applicable	☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES	☐Applicable	☒ N/A

X. OTHER REMEDIES
Institutional controls need to be implemented to prevent ground disturbance within the LUC area.

XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy
Although evidence of vegetation clearance and ground disturbance related to the Remedial Investigation is still visible, no other signs of construction activities were observed during the site inspection.
B. Adequacy of O&M
No evidence of unauthorized ground disturbance was observed. Locked gates at 3rd and 4th Streets are within the restricted access area and limit access to the site. However, the remedy will need to be implemented and LUC signs need to be installed.
C. Early Indicators of Potential Remedy Failure
None identified.
D. Opportunities for Optimization
None identified.

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Ford Island Landfill

Building 284 and Former Buildings 80/302

Various Transformer Sites

Shoreline Site Northwest of Dry Dock #3

4th Street Coral Pit

Attachment B: Site Photographs

Former Pearl City Junction

Building 6

Photograph No. 1: Overview of south border of LUC area, looking southwest down 4th Street.

Photograph No. 2: Dry grass, haole koa, and Kiawe trees growing in LUC area.

Photograph No. 3: Observed groundwater monitoring well in LUC area.

Photograph No. 4: Secured gate and signage restricting access onto 4th Street in the direction of the LUC area.

Photograph No. 5: Signage posted in front of gate restricting access from 3rd Street in the direction of the LUC area.

Photograph No. 6: Overview of the north part of LUC area, looking southwest down 3rd Street.

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Attachment C: Interview Forms

Former Pearl City Junction

Building 6

INTERVIEW RECORD

Site Name: 4th Street Coral Pit **DOH RPM:** Maria Reyes/Wendy Ray	**EPA ID No.:** HI4170090076
Subject: Five-Year Review Information Survey	**Time: 0926** **Date: 11/14/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Maria Reyes	**Title:** Regulatory Project Manager	**Organization:** DOH-HEER

Telephone No.: 808-586-4653 **Fax No.:** — **E-Mail Address:** maria.reyes@doh.hawaii.gov	**Street Address:** 919 Ala Moana Boulevard, Rm 206 **City, State, Zip:** Honolulu, Hawaii 96814

Summary of Conversation

1. How long have you been familiar with the project site?
   Since May 2009.
2. What is your overall impression of the project?
   I'm not really familiar with this project.
3. Is the remedy functioning as expected? How well is the remedy performing?
   N/A
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No, none of those. DOH doesn't visit routinely; we only visit with the EPA when they schedule a visit.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   No.

INTERVIEW RECORD

Site Name: 4th Street Coral Pit **EPA RPM:** Christopher Lichens	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1020**	**Date: 11/12/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Christopher Lichens	**Title:** Regulatory Project Manager	**Organization:** EPA

Telephone No.: 415-972-3149 **Fax No.:** **E-Mail Address:** lichens.christopher@epa.gov	**Street Address:** 75 Hawthorne Street **City, State, Zip:** San Francisco, CA 94105

Summary of Conversation

1. How long have you been familiar with the project site?
   About 4 years.
2. What is your overall impression of the project?
   I think once the anticipated remedy is in place, it will be fine.
3. Is the remedy functioning as expected? How well is the remedy performing?
   The remedy has not been implemented yet.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   The ROD has not been finalized yet.

INTERVIEW RECORD

Site Name: 4th Street Coral Pit **Navy RPM:** Joel Narusawa	**EPA ID No.:** HI4170090076
Subject: Five-Year Review Information Survey	**Time: 1457** / **Date: 01/06/14**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Joel Narusawa	**Title:** Remedial Project Manager	**Organization:** Navy
Telephone No.: 808-471-1171 ext. 222 **Fax No.:** — **E-Mail Address:** joel.narusawa@navy.mil	**Street Address:** 400 Marshall Road **City, State, Zip:** JBPHH, HI 96860-3139	

Summary of Conversation

1. How long have you been familiar with the project site?
   Since 2009.
2. What is your overall impression of the project?
   Good.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes, not much is happening.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities, including LUC inspections.
   No, there shouldn't be at this time.
6. Have there been unexpected costs or difficulties at the site in the last five years (or since the ROD was signed? Please provide details.
   N/A.
7. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.
8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   No.
9. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
10. Do you have any comments, suggestions, or recommendations regarding the project?
    No.

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CONTENTS

Former Pearl City Junction

FIGURE

TABLES

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
Bldg.	building
CCH	City and County of Honolulu
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
COPC	chemical of potential concern
CSM	conceptual site model
DOH	Department of Health, State of Hawaii
DRMO	Defense and Reutilization Marketing Office
EAL	environmental action level
EPA	Environmental Protection Agency, United States
ER	environmental restoration
ERA	ecological risk assessment
FISC	Fleet and Industrial Supply Center
LUC	land use control
JBPHH	Joint Base Pearl Harbor-Hickam
MDC	maximum detected concentration
mg/kg	milligram per kilogram
MSA	Manana Storage Area
MW	monitoring well
NAVFAC	Naval Facilities Engineering Command
no.	number
NPL	National Priorities List
O&M	operation and maintenance
PA	preliminary assessment
PCB	polychlorinated biphenyl
PCJ	Pearl City Junction
PHNC	Pearl Harbor Naval Complex
PHNWR	Pearl Harbor National Wildlife Refuge
PRE	preliminary risk evaluation
PRG	preliminary remediation goal
RAB	Restoration Advisory Board
RAO	remedial action objective
RAWP	remedial action work plan
RGA	regional groundwater assessment
RI	remedial investigation
ROD	Record of Decision
RPM	remedial project manager
SI	site inspection
SSL	soil screening level
TBC	to be considered
TFH	total fuel hydrocarbons
TPH	total petroleum hydrocarbons
U.S.	United States
VOC	volatile organic compound
WP	work plan

1. Site Chronology

The Former Pearl City Junction (PCJ) site is a land use control (LUC) site in the Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) sites at Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii. Significant events relevant to this site are presented in Table 1-1.

Table 1-1: Former Pearl City Junction Site Chronology of Events

Event	Date of Event
The Navy's Fleet and Industrial Supply Center (FISC) acquired the Former PCJ site in 1944, and constructed four warehouse buildings at the site. The FISC used the site to store nonhazardous war supplies until 1962 (DON 2010).	1944-1962
The Defense and Reutilization Marketing Office (DRMO) began using the site to store and distribute excess materials. Products including lime, fuel, hydraulic fluid, photographic chemicals, and paints were stored, in addition to tires and vehicles. Transformers containing polychlorinated biphenyls (PCBs) and other deteriorating and leaking containers were also reportedly stored in the open area (Ogden 1994).	1962-1989
The Naval Facilities Engineering Command (NAVFAC), Pacific conducted a Preliminary Assessment and recommended no further action for the site under the NAVFAC Pacific Environmental Restoration Program; however, the United States Environmental Protection Agency (EPA) Region 9 did not concur with this recommendation (NEESA 1988).	1988
The DRMO vacated Buildings (Bldgs.) 1 and 3 and the eastern and central portions of Bldg. 4. Various tenants then used the warehouse buildings for nonhazardous material storage (Ogden 1994).	1988-1989
The Navy Public Works Center sampled soil at the site and elevated levels of PCBs were found in soil (Ogden 1993).	1990
The site inspection report recommended further evaluation of the site, as well as delineation and remediation of dieldrin, beryllium, copper, and total petroleum hydrocarbons (TPH)/total fuel hydrocarbons; removal of PCBs was already scheduled. The State of Hawaii Department of Health (DOH) recommended soil remediation with site-specific cleanup goals for PCBs, dieldrin, TPH, and metals (Ogden 1993).	1990-1991
A baseline risk assessment report concluded that future trespassers, commercial workers, and construction workers could be exposed to potential health risk if no further action were taken at the site, and noted that PCBs and dieldrin in soil were the cause of the majority of the potential risk. The report recommended removal of soils with PCB and dieldrin concentrations exceeding specified cleanup goals and implementation of institutional controls to limit the use of the site to commercial/industrial purposes (NEHC 1993).	1993
The Navy submitted an Environmental Baseline Survey for Transfer (Ogden 1994) and a Finding of Suitability to Transfer the PCJ Site (DON 1994) to the State of Hawaii. The property eventually transferred to the City and County of Honolulu pursuant to a Quitclaim deed (Navy Quitclaim Deed Number N6274294RP00126).	1994
Soil with PCB concentrations exceeding the DOH-approved cleanup goal for total PCBs (10 milligrams per kilograms [mg/kg]) was removed from the site. The removal action also included excavation and disposal of soil with dieldrin concentrations exceeding the DOH-approved cleanup goal for dieldrin (1 mg/kg) (OHM 1994).	1993-1994
Home Depot U.S.A., Inc. collected soil samples and detected PCB concentrations above the DOH-approved cleanup goal for total PCBs (10 mg/kg). A second PCB removal action was performed to excavate impacted soil and dispose offsite. Verification soil samples collected from the excavation indicated that soil with PCB concentrations above the cleanup goal remained; further delineation and excavation were, therefore, performed to remove the impacted soil (OHM 1999).	1997-1998
An environmental agreement was signed between the Navy and Home Depot U.S.A., Inc. and stated the land use and groundwater restrictions at the Former PCJ (Home Depot U.S.A., Inc. and United States Navy 1999).	1999
The City and County of Honolulu sold the property to the commercial firm Home Depot U.S.A., Inc. An Environmental Agreement and Modification of Reserved Access Right between the Navy and Home Depot (Home Depot U.S.A., Inc. and United States Navy 1999) documents covenants that restrict land use to commercial or industrial, and grants right of access to the property to the Navy for the purpose of performing environmental remediation. By Special Warranty Deed recorded in the State of Hawaii Bureau of Conveyances, as Document Number 2003-01959, Home Depot conveyed the eastern end of the property to Public Storage, LLC. (CCH and Home Depot 2000).	2000

Event	Date of Event
Home Depot U.S.A., Inc. removed a former Air Force fuel pipeline located along the northern boundary of the Former PCJ site in June–July 2000. No apparent impact (odors or field equipment readings) was observed in soil during the removal. The abandoned pipeline also reportedly carried aviation fuels and automotive gasoline. Another former pipeline was abandoned in place (DON 2002).	2000
Groundwater monitoring wells were installed at the Former PCJ site as part of a Regional Groundwater Assessment (Earth Tech 2003). Ethylbenzene, TPH-gasoline range organics, and arsenic concentrations above risk-based screening criteria were detected in a soil sample from one of the soil borings. Fuel fingerprinting analysis indicated that constituents of the product observed in the two soil borings were consistent with aviation gasoline. No Navy activities involving aviation fuel were recorded for the Former PCJ Site.	2001-2002
Home Depot U.S.A., Inc. conveyed the eastern portion of the Former PCJ Site to Public Storage, LLC through a special warranty deed.	2003
The Air Force conducted a remedial investigation (RI) to characterize the nature and extent of soil and groundwater contamination attributable to releases from the fuel pipelines in the vicinity of the Former PCJ site (TEC 2007a). In November 2007, the Air Force submitted a RI Work Plan Addendum for additional investigation to further characterize the extent of fuel-related contamination at the site (TEC 2007b).	2005
A Record of Decision for the Former PCJ site was completed with LUCs selected as the final remedy (DON 2010).	2010

2. Background

2.1 Site Description

The Former PCJ Site occupies 13.7 acres south of Kamehameha Highway and west of the intersection of Kamehameha Highway and Waimano Home Road on the island of Oahu, Hawaii (Figure 1). The site is part of the PHNC NPL site under the United States (U.S.) Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System number (no.) HI4170090076. The southern boundary of the site is approximately 0.9 miles from the shoreline of the Middle Loch of Pearl Harbor. Four warehouse buildings and an open storage area formerly existed at the site.

The Navy's Fleet and Industrial Supply Center (FISC) acquired the PCJ property in 1944, and constructed four warehouse buildings at the site. The FISC used the site to store nonhazardous war supplies until 1962, when the Defense and Reutilization Marketing Office (DRMO) began using the site to store and distribute excess materials. The DRMO used Buildings (Bldgs.) 1, 2, and 3 primarily for storage of general cargo. Approximately one-third of Bldg. 4 was used to receive excess materials that were sold to the public; the remaining portion was used for offices and a public auction bidding area. Although products including lime, fuel, hydraulic fluid, photographic chemicals, and paints were stored in Bldg. 4, no spills were reported (Ogden 1994). In 1984, the DRMO vacated Bldg. 2, and the Navy Exchange began using it as a rental storage facility for military personnel. In 1988, the DRMO vacated Bldgs. 1 and 3 and the eastern and central portions of Bldg. 4. From 1988 through 1989, various tenants used the warehouse buildings for nonhazardous material storage (Ogden 1994).

From 1962 through 1989, the DRMO used the open area south of Bldg. 4 for storage of tires and surplus vehicles that were later sold to the public. After 1989, the DRMO vacated Bldgs. 1 and 3 and the eastern and central portions of Bldg. 4. Various tenants then used the warehouse buildings for nonhazardous material storage. Transformers containing polychlorinated biphenyls (PCBs) and other deteriorating and leaking containers were also stored in the open area (Ogden 1994). All the warehouse buildings were demolished between 1994 and 1997.

In 1994, the Navy submitted an Environmental Baseline Survey for Transfer (Ogden 1994) and a Finding of Suitability to Transfer the PCJ Site (DON 1994). The property then transferred from the Navy to the State of Hawaii on 29 July 1994 pursuant to a Quitclaim Deed recorded in the State of Hawaii, Bureau of Conveyances, as Document no. 94-127207. Immediately following recording of the Navy Quitclaim Deed, the property again transferred to the City and County of Honolulu (CCH) pursuant to a Quitclaim Deed recorded in the State of Hawaii, Bureau of Conveyances, as Document no. 94-127208. The Quitclaim Deed reserves right of access to the property for the Navy for the purpose of performing environmental remediation. In early 2000, the CCH sold the property to the commercial firm Home Depot U.S.A., Inc. Prior to the sale, an Environmental Agreement and Modification of Reserved Access Right between the Navy and Home Depot (Home Depot U.S.A., Inc. and United States Navy 1999) was developed to document covenants that restrict the land to commercial or industrial use, and grant right of access to the property to the Navy for the purpose of performing environmental remediation. In 2003, Home Depot conveyed the eastern end of the property to Public Storage, LLC by Special Warranty Deed, which was recorded in the State of Hawaii Bureau of Conveyances as Document no. 2003-01959.

2.2 PHYSICAL CHARACTERISTICS

2.2.1 Topography

The closest surface water bodies to the Former PCJ Site are Waiawa Stream and Waiawa Spring. Waiawa Stream is located approximately 250 feet west of the southwest corner of the site at the nearest point, and meanders south for approximately 6,000 feet before discharging into the Middle Loch of Pearl Harbor. Waiawa Spring is located approximately 2,000 feet southwest of the site, and feeds a small unnamed stream that flows southwestward for approximately 1,500 feet before entering Middle Loch. The spring discharge is also used for irrigation and to supply fresh water to the Waiawa Unit of the Pearl Harbor National Wildlife Refuge (PHNWR) (located approximately 2,500 feet southwest of the Former PCJ Site). There is no evidence of a surface water connection between Waiawa Spring and either the Former PCJ Site or Waiawa Stream. Surface water runoff from the Former PCJ Site drains into the storm sewer system.

2.2.2 Geology and Soils

Soils on the Coastal Plain surrounding Pearl Harbor, including the Pearl City Peninsula, are derived primarily from the caprock formation. The caprock consists of interbedded terrestrial and marine deposits including alluvium eroded from the Koolau Volcanics and coralline limestone sediments. Low-permeability clay and silty clay units in the caprock form confining layers over a deep artesian aquifer in the underlying Koolau basalts (Earth Tech 2006). At the Former PCJ Site, the caprock formation overlies the Koolau Basalt, and confines groundwater within the highly permeable basalt (DON 2010).

Borings for the monitoring wells installed at the Former PCJ Site were drilled to depths of approximately 20 to 40 feet below ground surface (bgs). The boring logs indicate that fill material, consisting of sandy gravel, silty gravel, clayey gravel, and gravel, is present at the site to a depth of approximately 15 feet bgs. Beneath 15 feet bgs, the low-permeability strata (i.e., silt and clay) of the underlying caprock formation were observed (Earth Tech 2003).

2.2.3 Groundwater Hydrology

Two distinct types of groundwater underlie the Former PCJ, a deep regional basal aquifer as well as a near-surface water-bearing zone within the caprock formation. Both the near-surface caprock groundwater and the deep basal groundwater generally flow toward Pearl Harbor, and are recharged by infiltration from rainfall, streams, and irrigation.

The basal aquifer underlies the Former PCJ Site at depth (approximately 100 feet bgs) and is part of the Pearl Harbor Aquifer, the most productive aquifer in the State of Hawaii. The basal groundwater originates as rainwater falling on the Koolau Mountains to the north and northeast, which percolates downward into the basal aquifer within the basalt bedrock. The basal groundwater migrates seaward through zones of highly permeable, fractured basalt, flowing beneath the low-permeability caprock formation as it approaches the shoreline (Wentworth 1951, Mink 1980, Mink et al. 1988).

The near-surface (approximately 30–36 feet bgs) caprock groundwater occupies low-permeability sediments that overlie and confine the basal groundwater within the basaltic bedrock that underlies the Pearl Harbor area. The caprock groundwater is recharged by water that infiltrates the near-surface sediments and percolates downward to the caprock saturated zone. The caprock groundwater also may be recharged in some areas by upward leakage from the basal aquifer; however, based on the data and information acquired during the regional groundwater assessment (RGA), this does not occur at the Former PCJ Site (Earth Tech 2003).

2.3 LAND USE

The current and anticipated future land use for the Former PCJ Site is commercial/industrial. The western portion of the site is owned and occupied by a Home Depot U.S.A., Inc. retail store at the west end of the site. The eastern end of the site is owned by Public Storage LLC., and includes a Public Storage facility. The CCH Department of Planning and Permitting zoning designation for the property is industrial mixed-use (IMX-1), indicating that activities other than industrial or commercial operations are not permitted at the property. The site is currently used only for commercial (retail and storage) purposes, and use of the site is restricted to commercial or industrial activities. Development or use of the property for residential housing, recreational activities, elementary or secondary school facilities, long-term care facilities, or child day care facilities is prohibited under the LUCs.

2.4 HISTORY OF CONTAMINATION

The Navy and U.S. Air Force have investigated the site to evaluate the nature and extent of contamination, assess potential risks to human health, and design the response actions required to ensure that the Former PCJ site does not pose unacceptable risk to human health or the environment.

- 1988: *Preliminary Assessment (PA)* (NEESA 1988)
- 1990 – 1991: *Site Inspection (SI)* (Ogden 1993)
- 1993: *Baseline Risk Assessment* (NEHC 1993)
- 2001 – 2002: *Regional Groundwater Assessment (RGA)* (Earth Tech 2003)
- 2007: *Air Force Remedial Investigation (RI)* (TEC 2007a,b)

2.4.1 Preliminary Assessment (1988)

In 1988, the Naval Facilities Engineering Command (NAVFAC), Pacific conducted a PA to identify potential threats to human health or the environment associated with chemicals potentially released at the site (NEESA 1988). Based on a records search, interviews, and the lack of evidence of hazardous substance release, the PA report recommended no further action for the site under the NAVFAC Pacific Environmental Restoration (ER) Program; however, the EPA Region 9 did not concur with this recommendation.

2.4.2 Site Inspection (1990 – 1991)

The Navy Public Works Center initially sampled soil at the Former PCJ Site in November 1990. The analytical results indicated that elevated levels of PCBs occurred in soils within the open storage area in front of Bldg. 4. This sampling was followed by a SI (Ogden 1993) to assess whether hazardous substances had been released at the site, identify the types of chemicals that were released, and evaluate potential risks to human health and the environment. Soil samples collected from the eastern third of Bldg. 4 and the open storage area were submitted for analysis of total petroleum hydrocarbons (TPH), total fuel hydrocarbons (TFH), volatile organic compounds (VOCs), semivolatile organic compounds, PCBs, chlorinated pesticides, metals, and hydrogen ion concentration. Because results indicated elevated levels of PCBs, dieldrin, metals, and TPH/TFH in the soil, the SI report recommended further evaluation of the site and delineation and remediation of dieldrin, beryllium, copper and TPH/TFH (removal of PCBs was already scheduled). Because TPH/TFH was detected only at locations with elevated PCB or dieldrin concentrations, the TPH were considered to be associated with these chemicals (Ogden 1993). After reviewing the SI report, the State of Hawaii Department of Health (DOH) recommended soil remediation with site-specific cleanup goals for PCBs, dieldrin, TPH, and metals (Ogden 1993).

2.4.3 Baseline Risk Assessment

A baseline risk assessment for the Former PCJ Site completed in August 1993 assessed risks associated with human and environmental exposure to all the chemicals identified in the SI and by regulatory agencies (NEHC 1993). The baseline risk assessment evaluated exposure pathways for the future outdoor/indoor commercial/industrial worker, future trespassing child and adult, current future nearby resident, future construction workers, current and future school child, and current and future school faculty/staff. The baseline risk assessment report concluded that the site posed no unacceptable risk to ecological receptors at the site or to nearby critical habitat areas, and that the site "does not pose an unacceptable heath risk, as defined by EPA, to current and future nearby residents or to students and adults at the Pearl City Elementary School." However, the baseline risk assessment report also concluded that future trespassers, commercial workers, and construction workers could be exposed to potential health risks if no further action were taken at the site, and noted that most of the potential risk was due to PCBs and dieldrin in soil. Transport of contaminants off site or to deeper soil depths was not expected. The report recommended removal of soils with PCB and dieldrin concentrations exceeding specified cleanup goals, followed by backfilling with at least 10 inches of clean soil. In addition, the report recommended implementing institutional controls to limit the use of the site to commercial/industrial purposes (NEHC 1993). The DOH concurred with the baseline risk assessment report recommendations and approved the cleanup goals specified for the site.

2.4.4 Regional Groundwater Assessment (2001 – 2002)

In 2001 and 2002, five groundwater monitoring wells were installed at the Former PCJ Site as part of a RGA to evaluate the potential for contamination resulting from historic activities and assess the potential for interconnectivity between groundwater beneath the Former PCJ site and the Former Manana Storage Area (MSA) site. The RGA groundwater samples were analyzed primarily to evaluate the nature and extent of the constituents identified as chemicals of potential concern (COPCs) for the Former MSA and Former PCJ sites (arsenic, copper, lead, zinc, dieldrin, PCBs, and VOCs). However, because petroleum product was observed in soil cuttings from two of the five borings, subsurface soil samples were collected from the borings and analyzed for metals, TPH, VOCs, and polynuclear aromatic hydrocarbons. Ethylbenzene, TPH-gasoline range organics, and arsenic concentrations above risk-based screening criteria were detected in a soil sample from one of the borings. No PCBs or dieldrin (the principal COPCs identified for the Former PCJ site) were detected in the subsurface soil or groundwater samples collected during the RGA. Fuel fingerprinting analysis indicated that constituents of the product observed in the two soil borings were consistent with aviation gasoline. No Navy activities involving aviation fuel are recorded for the Former PCJ site; however, Air Force pipelines located along and directly upgradient of the northern site boundary historically carried aviation gasoline.

The conceptual site model (CSM) summary diagram developed for the RGA indicated that the COPCs associated with Navy activities at the two sites are not likely to be transported from soil to groundwater, and that the groundwater bodies beneath the Former MSA and Former PCJ Sites are not connected. The RGA report recommended further characterization of groundwater at the Former PCJ site and further evaluation of the fuel-related contamination (Earth Tech 2003). The Navy discussed the fuel-related impacts in soil and groundwater at the site with the Air Force, and the Air Force agreed to characterize and remediate the contamination as required to protect human health and the environment. The RGA recommended no further Navy action for groundwater because none of the chemicals detected in the groundwater are attributable to past Navy operations.

2.4.5 Air Force Remedial Investigation (2007)

The Air Force conducted a RI to characterize the nature and extent of soil and groundwater contamination attributable to releases from the fuel pipelines, and submitted a RI report to the DOH in August 2007 (TEC 2007a). In November 2007, the Air Force submitted a RI work plan (WP) Addendum for additional investigation to further characterize the extent of fuel-related contamination at the site, which the Air Force identified as ST18A, Hickam petroleum, oil, and lubricants Site (TEC 2007b).

2.5 INITIAL RESPONSE

Three previous response actions have been performed to ensure that the Former PCJ site does not pose unacceptable risk to human health or the environment under the current and potential future land and groundwater use scenarios.

- 1993 – 1994: PCB and Dieldrin Removal Action (DON 1993, OHM 1994)
- 1998: Second PCB Removal Action (OHM 1999)
- 2000: Air Force Fuel Pipeline Removal (DON 2002)

2.5.1 1993–1994 Removal Action

In 1993 and 1994, soil with PCB concentrations exceeding the DOH-approved cleanup goal for total PCBs (10 milligrams per kilogram [mg/kg]) was removed from the western section of the open storage area, and the excavated areas were backfilled with clean soil. The results of verification sampling conducted to confirm removal of the PCB-impacted soil are presented in a Verification Sampling Report (Ogden 1997). The 1993–1994 removal action also included excavation and disposal of soil with dieldrin concentrations exceeding the DOH-approved cleanup goal for dieldrin (1 mg/kg). The dieldrin-impacted soil was generally restricted to depths of 1 foot or less, and was removed from an area in the southeast corner of the open storage area. The excavation area was backfilled with clean soil, and the contaminated soil was disposed of at a CERCLA-approved facility on the U.S. mainland. Successful completion of the dieldrin removal is documented in a closure report (OHM 1994). An action memorandum (DON 1993) was prepared to request and document approval of the dieldrin removal action.

2.5.2 1998 Removal Action

In July 1997, Home Depot U.S.A., Inc., as a prospective buyer, collected soil samples from the west-central area of the open storage area, and detected PCB concentrations above the DOH-approved cleanup goal for total PCBs (10 mg/kg). The Navy then performed an initial round of soil sampling to confirm the presence of soil with PCB concentrations above the cleanup goal, and conducted delineation sampling to define the extent of the PCB-impacted soil. The impacted soil was then excavated and disposed of at a CERCLA-approved facility on the U.S. mainland. Verification soil samples collected from the excavation indicated that soil with PCB concentrations above the cleanup goal remained; further delineation and excavation were therefore performed to remove the impacted soil. A second set of post-excavation verification soil samples was collected, and the analytical results showed that the cleanup goal had been achieved. The excavation area was backfilled with clean soil and the impacted soil was disposed of at a CERCLA-approved U.S. mainland facility. Successful completion of the removal action is documented in a remediation verification report (OHM 1999).

2.5.3 Fuel Pipeline Removal (2000)

U.S. Air Force documents identify a former Air Force fuel pipeline that ran generally east-west along the northern boundary of the Former PCJ site. The Air Force indicated that this pipeline historically carried aviation fuels and automotive gasoline (URS 2002, USGS 1990). Home Depot U.S.A., Inc. removed this pipeline in June–July 2000. No apparent impact (odors or field equipment readings) was observed in soil during the removal (DON 2002). One pipeline was removed, and the second fuel pipeline was abandoned in place. The abandoned pipeline also reportedly carried aviation fuels and automotive gasoline.

2.6 BASIS FOR TAKING REMEDIAL ACTION

The SI report and the baseline risk assessment report concluded that PCBs and dieldrin were detected in soil at concentrations exceeding human health target risk levels (Ogden 1993, NEHC 1993). The baseline risk assessment report also concluded that removal of soil with PCB or dieldrin concentrations exceeding specified cleanup goals would reduce risk to human receptors to acceptable levels for commercial/industrial activities. The DOH concurred with the baseline risk assessment report conclusions and the cleanup goals specified for the site.

A human health preliminary risk evaluation (PRE) was conducted during the RGA to assess potential risks to human health associated with exposure to soil and groundwater at the Former PCJ site (Earth Tech 2003). Reasonable maximum exposure point concentrations for surface and subsurface soil were compared to EPA Region 9 residential and industrial preliminary remediation goals (PRGs) (EPA 2013). The PRE confirmed that human health risk associated with potential exposure to surface and subsurface soil is within the acceptable range for commercial or industrial land use, but not for unrestricted residential use. The PRE results for groundwater indicated potentially unacceptable risk under the residential land use scenario and for the onsite construction worker; thus, not allowing for unrestricted use. The groundwater risk is attributable primarily to arsenic (98 percent); the remainder of the estimated risk is attributable to benzene. Although the maximum detected arsenic concentration exceeded the tap water PRG (EPA 2013), it does not exceed the current arsenic maximum contaminant level (EPA 2002). Arsenic concentrations in other caprock groundwater on Oahu are very similar to those in groundwater at the Former PCJ site. The RGA results therefore suggest that the arsenic detected in groundwater at the Former PCJ site is attributable to the breakdown of natural soil and rock formations along the caprock groundwater flow path (Earth Tech 2003) and is indicative of naturally occurring (background) concentrations. In addition, the caprock groundwater does not represent a viable current or potential future source of potable water, and is therefore not likely to threaten human health.

An ecological risk assessment (ERA) for the Former PCJ site was completed as part of the baseline risk assessment (NEHC 1993). The ERA evaluated site contamination, identified potential ecological receptors, and assessed potential exposure of ecological receptors to COPCs. The site contains vegetation and habitat characteristic of disturbed areas, and no threatened or endangered species are known to frequent the site or the surrounding area. The closest critical habitat areas are Waiawa Stream and the Waiawa Unit of the PHNWR. Because the COPCs have not migrated off site, no critical habitat areas have been impacted by site activities. The ERA concluded that chemicals attributable to past Navy operations at the site do not pose a threat to the wildlife or ecology of the site or to nearby critical habitat areas (NEHC 1993).

The response action selected in the record of decision (ROD) was necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. The selected final remedy (as well as previous response actions) addresses subsurface soil containing PCBs and dieldrin at concentrations that could pose unacceptable risk to humans if unlimited or unrestricted use of the site is allowed.

The results of previous site investigations, decision documents, and risk assessment calculations led to the identification of the chemicals of concern and the selection of cleanup goals established by the Navy for the Former PCJ site, as listed in Table 2-1.

Table 2-1: COCs and Cleanup Goals for the Former PCJ Site

COC	Maximum Detected Concentration (mg/kg)	Screening Criteria (EPA Region IX 2005 PRGs) (mg/kg)	Navy Established Cleanup Goal (mg/kg)
Soil			
PCBs	8.70	0.22	10
Dieldrin	0.96	0.03	1

Sources: PCBs: Final Closure Report (OHM 1995); Dieldrin: Final RVR (OHM 1999).
COC chemical of concern

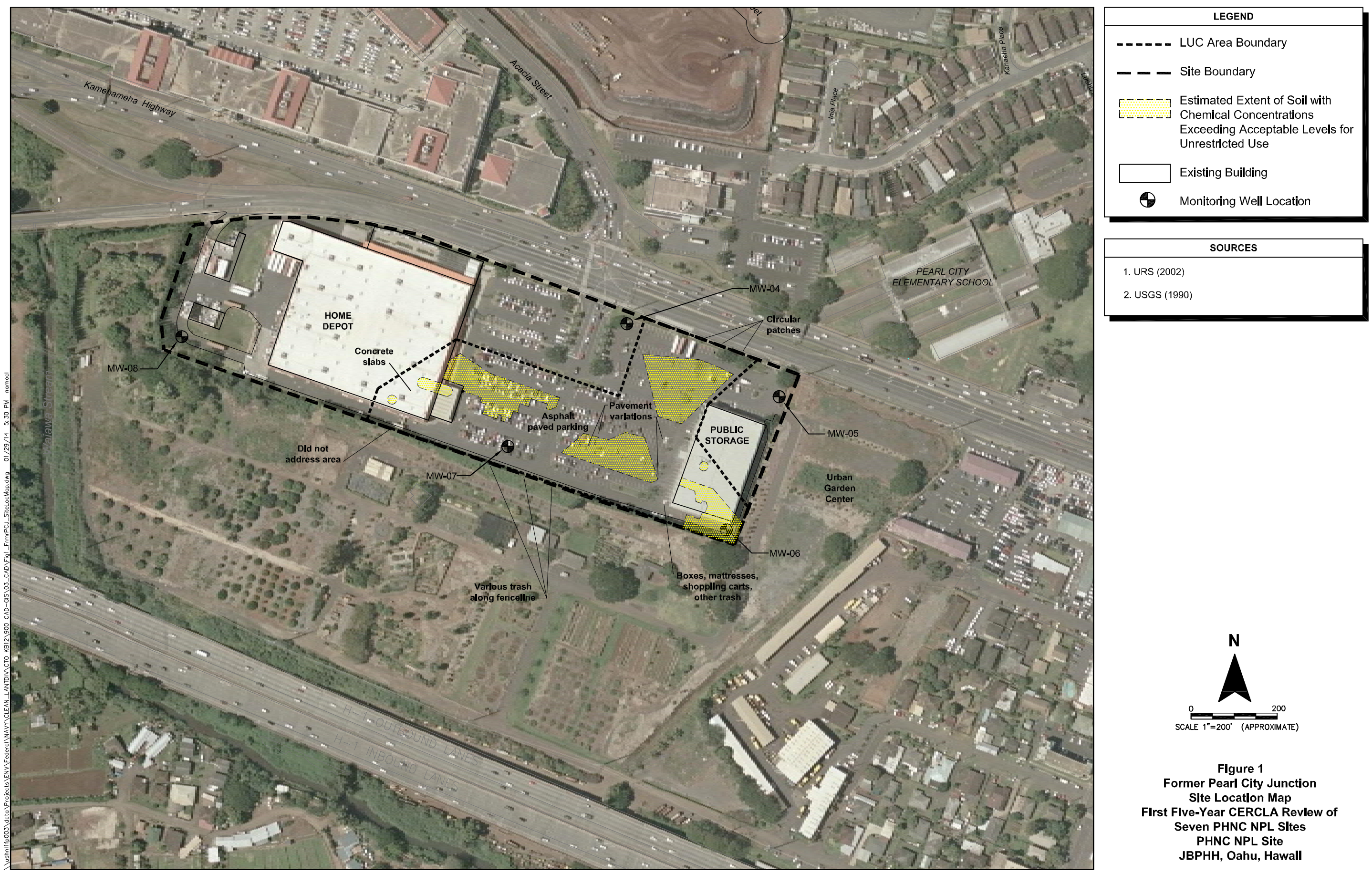

Figure 1
Former Pearl City Junction
Site Location Map
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

3. Remedial Actions

A ROD was signed by the Navy and EPA in 2010 to address subsurface contamination and specifies LUCs as the final remedy for the Former PCJ Site (DON 2010). The landowner was not included as a signatory on the ROD.

3.1 Remedial Action Objectives

The principal objectives of the final response action for the Former PCJ Site are as follows:

- Prevent development of the site for any use other than commercial or industrial activities.
- Minimize or eliminate direct human contact with, or ingestion of, contaminated soil.
- Prevent migration or relocation of contaminated soil to areas where human or ecological exposure could occur.

3.2 Remedy Description

The ROD selected LUCs as the final remedy for the Former PCJ site. LUCs are necessary to protect the public health, welfare or the environment from actual or threatened releases of hazardous substances into the environment. The selected final remedy (as well as previous response actions) addressed subsurface soil containing PCBs and dieldrin at concentrations that could pose unacceptable risk to humans if unlimited or unrestricted use of the site is allowed. Concentrations of these chemicals are acceptable for industrial/commercial use; therefore, the LUCs would ensure that risks to human health and the environment remain acceptable by prohibiting activities other than commercial or industrial operations in the areas where chemical concentrations in soil exceed levels that would allow for unrestricted land use and unlimited human exposure. The LUCs will be maintained as long as required to ensure protection of human health and the environment.

3.3 Remedy Implementation

The property was transferred from the Navy to the State of Hawaii in 1994, then later that year to CCH. The Quitclaim Deeds for the property reserved the right of access to the property for the Navy for the purpose of performing environmental remediation. In early 2000, the CCH sold the property to the commercial firm Home Depot U.S.A., Inc. An Environmental Agreement and Modification of Reserved Access Right between the Navy and Home Depot (Home Depot U.S.A., Inc. and United States Navy 1999) documents covenants that restrict land use to commercial or industrial, and grants right of access to the property to the Navy and was part of the deed. By Special Warranty Deed recorded in the State of Hawaii Bureau of Conveyances, as Document No. 2003-01959, Home Depot conveyed the eastern end of the property to Public Storage, LLC.

A remedial action work plan (RAWP) is being prepared, but was unavailable at the time of publication of this five-year review report. It is understood that the RAWP will document in detail the engineering and institutional controls that need to be maintained to meet the LUC performance objectives. Responsibilities of the Navy, regulatory agencies, and landowners for implementing, maintaining, reporting on, and enforcing the LUCs will be described in the RAWP document. Although the Navy may later transfer these procedural responsibilities to another party by contract or through other means, the Navy shall retain ultimate responsibility for remedy integrity. The LUCs will be maintained until the concentrations of hazardous substances in the soil are at such levels to allow for unrestricted use and unlimited exposure. Deed restrictions and covenants have been developed to limit future land use to non-residential (commercial/industrial) use only. However, the deed restrictions and covenants were not incorporated into the deed. Five-year statutory reviews shall be conducted to ensure that the LUC mechanisms are still in place (e.g., land use is still consistent with the deed restrictions).

3.4 SYSTEMS OPERATIONS AND MAINTENANCE

Except for compliance monitoring, the Former PCJ site does not have an active remedial system.

According to the remedial project manager (RPM), no significant cost variances indicative of potential problems were identified with regards to the operation and maintenance (O&M) costs.

4. Progress since the Last Five-Year Review

This is the first five-year review for the Former PCJ site, a PHNC NPL site on Oahu, Hawaii. Consequently, there is no new progress to report since the previous five-year review as none has been conducted.

5. Five-Year Review Process

5.1 Administrative Components

The public was notified of the initiation of this five-year review in July 2013. The five-year review team members are listed in Table 5-1.

Table 5-1: Five-Year Review Team Members

DOH	Regulatory Project Manager: Maria Reyes/Wendy Ray
DON	RPM for five-year review: Jan Kotoshirodo
	RPM for specific site: Eric Shigaki
EPA	Regulatory Project Manager: Christopher Lichens
AECOM	Project Manager: Dean Baxley
	Deputy Project Manager: Teresa Quiniola
	Project Support: Dustin Goto, Andrea VonBurg Hall

AECOM AECOM Technical Services, Inc.
DON Department of the Navy

The team members established a review schedule of May to December 2013, during which they completed the following activities: performed community involvement related to the current five-year review, reviewed relevant documents, performed data review, conducted a site inspection, and conducted site project manager and regulator interviews.

5.2 Document Review

This five-year review consists of a review of relevant documents including, O&M records, the ROD, deeds, environmental covenants, remedial investigations, feasibility studies, risk assessments, WPs, remedial designs, completion reports, long-term monitoring and operation reports, monitoring data, and various compliance reports. The list of documents reviewed is provided in Section 9. Applicable soil and other cleanup standards, as listed in the ROD, were reviewed. Applicable or relevant and appropriate requirements and to be considered criteria that have changed since the ROD were also evaluated and are presented in Table 5-2.

Table 5-2: Summary of ARAR and TBC Changes

Citation	Requirement of Law/Regulation	Evaluation of Changes and Comments
DOH EALs (DOH 2011)	Tier 1 EALs for soil and groundwater that is not a potential drinking water source and >150 meters from surface water were identified as chemical-specific TBC criteria.	The DOH Tier 1 EALs were updated in 2011. Under the revised criteria, the EALs for dieldrin in soil increased, and the action level for PCBs did not change.
EPA Region 9 Soil Screening Levels (SSLs) (EPA 2005)	SSLs consist of chemical soil concentrations used to determine the potential for migration of contaminants from soil to groundwater.	The SSLs were incorporated into the RSLs in 2009. Table 6-1 presents a detailed evaluation of the changes in soil screening criteria for the site. However, these changes do not impact the protectiveness of the remedy.

Source: DON 2010.
ARAR applicable or relevant and appropriate requirement
EAL environmental action level
RSL regional screening level
TBC to be considered

5.3 DATA REVIEW

No annual inspections for the Former PCJ site were available for review.

5.4 SITE INSPECTION

A five-year review site inspection at the Former PCJ site was conducted on 9 October 2013 to assess the operations and effectiveness of LUCs at the site. During the site visit, the weather was sunny and the temperature averaged 78 degrees Fahrenheit. As observations were made, a five-year review site inspection checklist was completed to document the status of the site (see Attachment A).

The Former PCJ site is currently used by Home Depot and Public Storage, who occupy buildings on the western (Home Depot) and eastern (Public Storage) portions of the site. A large asphalt-paved parking lot makes up the remainder of the site between the buildings. The LUC area is comprised of the parking lot area and parts of the southeast and southwest corners of the Home Depot and Public Storage buildings, respectively. During the site visit, the LUC areas to the south of the Home Depot and Public Storage buildings and on the interior of the Public Storage building could not be accessed and, therefore, were only inspected from a distance.

In general, the asphalt pavement of the parking area appeared in good condition and without significant cracks or holes. Of note, several pavement variations in the vicinity of the Public Storage building and four circular concrete or gravel patches along the northern border of the site were observed. The circular shape and size of the patches on the northern part of the site are similar in appearance to abandoned boreholes. It is unclear as to whether any ground disturbance activities associated with the circular patches or pavement variations near the Public Storage building occurred before or after the ROD was signed in September 2010. The circular patches along the northern site border are similar to those from geotechnical investigations for a rail transit project observed within Kamehameha Highway, which adjoins the site to the north. Therefore, these abandoned boreholes appear to be associated with work unrelated to the environmental investigation at the Former PCJ site.

Monitoring well (MW)-07 was observed to be abandoned at the time of the site visit. MW-04 and MW-05 appeared to be in good condition. The flush-mount monuments of the wells were not opened to further assess the condition of the well cap and casing.

The interior LUC area of the Home Depot building consists of concrete slab flooring. During the site visit, the concrete appeared to be in good condition (without significant cracks) and no other marks indicative of earthwork were observed.

Although not directly related to the protectiveness of the institutional controls at the site, noticeable amounts of trash were observed along the fence bordering the site to the south and on the exterior southwest corner of the Public Storage building. Most of the trash on the south fenceline is likely windblown debris; however, other debris was likely purposely disposed there. The trash near to the Public Storage building consisted of boxes, mattresses, trash bags, and shopping carts, suggesting homeless people may frequent the site.

Locations of notable observations made during the site visit are presented in Figure 1. Photographs from the site visit are presented in Attachment B.

5.5 INTERVIEWS

Interviews were conducted with the following personnel:

Name	Affiliation	Date
Maria Reyes/Wendy Ray	DOH, Regulatory Project Manager	14 November 2013
Christopher Lichens	EPA, Regulatory Project Manager	12 November 2013
Jan Kotoshirodo	NAVFAC Hawaii, RPM	15 November 2013

All three personnel expressed concern with the LUCs since the land is no longer owned by the Navy. The DOH regulatory project manager indicated that there are concerns since the landowner did not sign the ROD and LUCs may not be part of the deed. The EPA regulatory project manager had similar concerns that the LUCs may not have been properly conveyed to the current landowner. In addition, the Navy RPM stated that the RAWP has not been completed due to not having the owner as one of the original signatories in the ROD. However, no violations or incidents have been reported at the site with regards to the LUCs.

Interview forms are presented in Attachment C.

6. Technical Assessment

Answers to the following three key technical questions are presented in tabular format below:

- A: Is the remedy functioning as intended by the decision documents?
- B: Are the assumptions used at the time of remedy selection still valid?
- C: Does any other information call into question the protectiveness of the remedy?

A review of the CSM for the Former PCJ site indicated that no significant changes to land use or site conditions were identified that would affect the remedy effectiveness.

SITE: FORMER PEARL CITY JUNCTION
QUESTION A: Is the remedy functioning as intended by the decision documents?

Element	Assessment
Remedial Action Performance	The final remedy at the Former PCJ includes LUCs. LUCs are the non-technical and non-engineering actions that will help mitigate potential risks to human health and the environment by restricting access to contaminated media. At the Former PCJ site, LUCs prohibit activities other than commercial or industrial operations in the areas where chemical concentrations in soil exceed levels that would allow for unrestricted land use and unlimited human exposure.
System Operations/O&M	No active systems are in place.
Cost of Systems Operations/O&M	No cost variances were identified that suggest the remedy is not properly functioning.
Opportunities for Optimization	In 2010, Hickam Air Force Base and Pearl Harbor were combined into JBPHH. The former Air Force Base has a LUC area (ST18-A, Hickam POL site) that overlaps with the LUC area for the Former PCJ site. LUC inspections at both sites may be combined to maximize the efficiency of maintenance and monitoring efforts.
Early Indicators of Potential Remedy Failure	The RAWP has not been completed as of the publication of this report. The property has changed owners a few times since the Navy deeded it to the State of Hawaii in 1994. There are concerns with the transition of LUC requirements to the current owner.
Implementation of Institutional Controls and Other Measures	A RAWP has not been completed for this site and the deeds may not properly convey the LUCs. This indicates that institutional controls and other measures may have not yet been fully implemented.

POL petroleum, oil, and lubricants

SITE: FORMER PEARL CITY JUNCTION
QUESTION B: Are the assumptions used at the time of remedy selection still valid?

Element	Assessment
Changes in Standards and TBC Requirements	Regulatory requirements including EPA and DOH Tier 1 soil action levels were considered in the selection of the final remedy. Changes to cleanup levels are discussed below under Changes in Toxicity and Other Contaminant Characteristics.
Changes in Exposure Pathways and Land Use	At the time of the ROD, land use for the Former PCJ Site was commercial/industrial. The western portion of the site was owned by Home Depot U.S.A., Inc., and included a Home Depot U.S.A., Inc. retail store at the west end of the site. The eastern end of the site was owned by Public Storage LLC., and included a Public Storage facility. No changes in ownership have occurred since the signing of the ROD. The CCH Department of Planning and Permitting show the zoning designation for the property to be industrial mixed-use (IMX-1), indicating that activities other than industrial or commercial operations are not permitted at the property. The site is currently used only for commercial (retail and storage) purposes, and use of the site is anticipated to remain the same in the future.
Changes in Toxicity and Other Contaminant Characteristics	Table 6-1 compares the PRGs used to derive the original risk estimates to the current screening criteria (EPA 2013). However, no changes in screening criteria have occurred since the previous risk assessment. The risk at the site remains unacceptable for residential use. The detected COCs were not evaluated in further detail because much of the COC-containing soils were removed during the NTCRAs. Remedial actions including soil removal, capping and implementation of LUCs are protective of the industrial worker. Therefore, the RAOs are not affected by any changes in toxicity and it is not necessary to update the standards used at the time of remedy selection.
Changes in Risk Assessment Methodologies	Changes in risk assessment methodologies since preparation of the ROD are chiefly related to estimation of risk via the inhalation pathway. However, the COCs present at the Former PCJ site do not generally pose an inhalation concern. Direct contact has been addressed by capping the areas with clean soil and asphalt, and the LUCs limit site use to commercial and industrial activities.
Remedy Byproducts	No remedy byproducts have been identified for consideration in this assessment.
New Contaminants and Contaminant Sources	No new contaminants or contaminant sources have been identified.
Expected Progress Toward Meeting RAOs	The site inspection results confirm that the site is still being used only for commercial and industrial purposes. The physical barriers (asphalt) placed to prevent exposure to contaminated soil are in place. Exposure pathways that could result in unacceptable risks are being controlled. The RAOs for the Former PCJ site remain appropriate.

NTCRA non-time-critical removal action
RAO remedial action objective

SITE: FORMER PEARL CITY JUNCTION
QUESTION C: Does any other information call into question the protectiveness of the remedy?

Element	Assessment
Overall	Yes, a RAWP needs to be finalized and implemented in accordance with the LUCs to continue to prevent exposure.

Table 6-1: FPCJ Review of Human Health Toxicity Data Used in Risk Assessment

Detected Analyte	MDC within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential Screening Criteria (mg/kg)	PRG Basis	Does MDC Exceed Current PRG?	Industrial Cancer Risk [a] Based on Current PRG and MDC	Conclusion
COCs Detected after Removal Action at Former PCJ								
Dieldrin	8.7	0.03	Yes	0.03	Cancer	Yes	2.9E-04	MDC still exceeds PRG. However, current risk is within acceptable cancer risk range of 10^{-6} to 10^{-4}.
PCBs	0.96	0.22	Yes	0.22	Cancer	Yes	4.4E-06	MDC still exceeds PRG. However, current risk is within acceptable cancer risk range of 10^{-6} to 10^{-4}.

Sources: MDCs (OHM 1995, 1999), Original PRGs (EPA 2005), Current PRGs (EPA 2013).
MDC maximum detected concentration
[a] Industrial cancer risk is derived using the following equation: (MDC/Current PRG) x (target risk level [10^{-6}]).

7. Issues, Recommendations, and Follow-up Actions

Issues identified during the site inspection and interviews are listed in Table 7-1.

Table 7-1: Issues and Recommendations for the Former Pearl City Junction Site

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Affects Protectiveness? (Y/N)	
				Current	Future
The LUCs may not have been properly conveyed to the current landowners.	Inform the landowner of the LUCs and the need to adhere to EPA, DOH, and Navy notification requirements prior to ground disturbance activities. The deed or environmental covenants should be revised as necessary to incorporate LUCs. Consider installing signs along the perimeter of the LUC areas and the front entrance gate to notify anyone onsite of the LUC areas and restrictions.	Navy	EPA/DOH	N	Y
A RAWP has not been finalized.	A RAWP may help ensure the remedy is being implemented as necessary.	Navy	EPA/DOH	N	Y
Annual LUC inspections were not available for review.	After completion of the RAWP, LUC inspections should be documented on an annual basis to ensure the continued effectiveness of land use restrictions at the site.	Navy and current landowner	EPA/DOH	N	Y
Since Hickam Air Force Base and Pearl Harbor combined, both LUC sites, Former PCJ and ST18-A, are overseen by the Navy.	Combining efforts for LUC implementation is not recommended because Former PCJ is part of the PHNC NPL, and ST18A is non-NPL.	Navy	EPA/DOH	N	N

8. Protectiveness Statement

The remedy at the Former PCJ, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment in the short term because no evidence of exposure to contaminated soil has occurred. However, in order for the remedy to be protective in the long-term, follow-up actions need to be taken. A RAWP, as well as the deeds and covenants, need to be finalized and implemented in accordance with the LUCs to continue to prevent exposure to soils with slightly elevated concentrations of contaminants at the site.

A change in land use is not expected in the foreseeable future.

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Attachment A: Five-Year Review Site Inspection Checklist

Building 6

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. "N/A" refers to "not applicable."

I. SITE INFORMATION

Site Name: Former Pearl City Junction	**Date of Inspection:** October 9, 2013
Location and Region: Honolulu, HI	**EPA ID:** HI4170090076
Agency, office or company leading the five-year review: NAVFAC Hawaii /AECOM	**Weather/temperature:** Sunny, mid 70s °F

Remedy Includes: (Check all that apply)
☐ Landfill cover/containment
☐ Access controls
☒ Institutional controls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
☒ Other – LTMM and LUCs

Attachments: ☐ Inspection team roster attached
Inspection Team Members:
Dustin Goto (AECOM)
Teresa Quiniola (AECOM)
☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** ☒ N/A
2. **O&M Staff** ☒ N/A

3. **Local regulatory authorities and response agencies** (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency Hawaii Department of Health

Contact	Name	Title here	Date	Phone Number
	Maria Reyes	Remedial Project Mgr.	November 14, 2013	808-586-4653

Agency EPA Region 9

Contact	Name	Title here	Date	Phone Number
	Christopher Lichens	Remedial Project Mgr.	11/12/2013	415-972-3149

Problems, suggestions: ☒ Report attached to Five-Year Review Report (Refer to Attachment C)
Remarks:

4. **Other interviews** (optional) ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Jan Kotoshirodo, NAVFAC RPM

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1. O&M Documents Remarks:	☐ Readily available	☐ Up to date	☒ N/A
2. Site-Specific Health and Safety Plan	☐ Readily available	☐ Up to date	☒ N/A
3. O&M and OSHA Training Records	☐ Readily available	☐ Up to date	☒ N/A
4. Permits and Service Agreements	☐ Readily available	☐ Up to date	☒ N/A
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
7. Groundwater Monitoring Records Remarks:	☐ Readily available	☐ Up to date	☒ N/A
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records	☐ Readily available	☐ Up to date	☒ N/A
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A

IV. O&M COSTS

1. O&M Organization
☐ N/A ☐ Contractor for State
☒ Other : PRP and landowner ☐ Contractor for PRP

2. O&M Cost Records
☐ Readily available ☐ Up to date
☒ Funding mechanism/agreement in place ☐ Breakdown attached
Original O&M cost estimate N/A

3. Unanticipated or Unusually High O&M Costs During Review Period
None

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged	☐ Location shown on map	☐ Gates secure	☒ N/A

B. Other Access Restrictions

1. Signs and other security measures ☐ Signs ☒ None ☐ N/A
Remarks: The Former PCJ site is currently occupied by Home Depot and Public Storage, and is therefore accessible by the public. No signs were observed at the time of the site visit prohibiting unauthorized digging or other ground disturbance activities.

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	☒ No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	☒ No	☐ N/A

Remarks: Several pavement variations in the asphalt parking lot were observed that suggest ground disturbance activities may have occurred in those areas. The variations were noted nearer to the Public Storage building on the east part of the site. It is unclear as to whether the potential ground disturbance activities occurred as part of or after the removal actions.

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

Two asphalt and two gravel patches were noted on the north border of the site. The size and shape of the patches are suggestive of abandoned boreholes. Two of the presumed borehole locations are within the sidewalk adjoining Kamehameha Highway, while two are in the grassed area between the sidewalk and the site parking lot. Several other patches were observed in Kamehameha Highway.

Type of monitoring (e.g., self-reporting, drive by): None to date

Frequency: See above

Responsible Party/Agency: NAVFAC Hawaii

Contact Name	Title	Date	Phone No.
Jan Kotoshirodo	RPM	11/15/13	808 471-1171 x341
Reporting is up-to-date	☐ Yes	☒ No	☐ N/A
Reports are verified by the lead agency	☒ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☒ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A

Other problems or suggestions: Reporting and annual inspections are not up to date. The remedial action work plan has not been completed as of the date of this report. Also see Section D.1 (Vandalism/Trespassing).

2. Adequacy ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A

Remarks: A remedial action work plan has not been complete and deeds may not properly address the LUC requirements.

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☐ No vandalism evident

Remarks: Unauthorized dumping was observed along the south fence of the site. Although no hazardous material was observed, the debris should be cleared. Several boxes, mattresses, trash bags, and shopping carts were also present next to the southwest corner of the Public Storage building which may suggest that homeless people may frequent the location.

2. Land use changes on site ☒ N/A

Remarks: The site is used by Home Depot and Public Storage. Both companies were using the site at the time of the ROD in September 2010.

3. Land use changes off site ☒ N/A

Remarks: Surrounding land uses are unchanged since the ROD in September 2010.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

B. Other Site Conditions ☒ N/A

Remarks: An asphalt-paved parking lot comprises a large proportion of the site.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A	
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A	
C. Treatment System ☐ Applicable ☒ N/A	
D. Monitoring Data ☒ N/A	
E. Monitored Natural Attenuation ☐ Applicable ☒ N/A	

X. OTHER REMEDIES
Institutional controls need to be implemented to prevent ground disturbance within the LUC area.

XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy The site is mostly paved, except for grassed islands within the parking lot and a narrow landscaped area next to Kamehameha Highway. As noted in Section V.C.1, several pavement variations were observed in the parking lot of the site and sidewalk area next to Kamehameha Highway. It is unclear as to whether any ground disturbance activities associated with the variations occurred before or after the removal actions and the ROD was signed..
B. Adequacy of O&M O&M consists of annual LUC inspections which are not currently being conducted.
C. Early Indicators of Potential Remedy Failure No remedial action work plan has been published for the site. The deeds may not properly convey the LUCs to the current owners. The paved areas of the site appear in good condition, but evidence of pavement variations were observed.
D. Opportunities for Optimization Appropriate security measures may be necessary to prevent unauthorized dumping at the site. LUC activities at the FPCJ may be combined with those for ST-18A, which the Navy is also responsible for and has LUCs within the same area.

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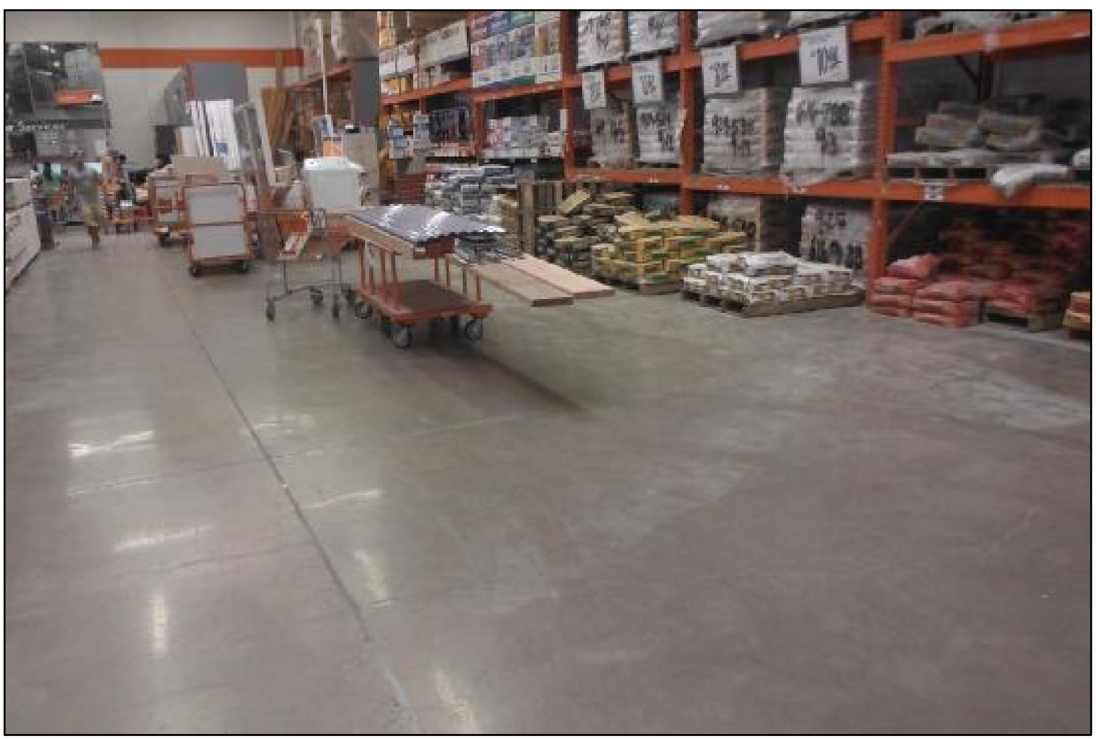
Attachment B: Site Photographs

Building 6

Photograph No. 1: Overview of west part of the site including Home Depot retail facility, looking northwest.

Photograph No. 2: Overview of the east part of the site, looking southeast.

Photograph No. 3: Abandoned monitoring well MW-07 within Home Depot parking area.



Photograph No. 4: Concrete slab floor observed in good condition within the LUC area inside the Home Depot retail facility.

Photograph No. 5: Variation in asphalt pavement in Public Storage parking area.

Photograph No. 6: Pavement variation on south side of Public Storage building.

Photograph No. 5: Unauthorized dumping on southwest corner of Public Storage building.

Photograph No. 6: Asphalt and gravel patch observed adjacent to northern border of LUC area.

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Attachment C: Interview Forms

Building 6

INTERVIEW RECORD

Site Name: Former Pearl City Junction **DOH RPM:** Maria Reyes	**EPA ID No.:** HI4170090076
Subject: Five-Year Review Information Survey	**Time: 0930** **Date: 11/14/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Maria Reyes	**Title:** Regulatory Project Manager	**Organization:** DOH-HEER

Telephone No.: 808-586-4249 **Fax No.:** — **E-Mail Address:** maria.reyes@doh.hawaii.gov	**Street Address:** 919 Ala Moana Boulevard, Rm 206 **City, State, Zip:** Honolulu, Hawaii 96814

Summary of Conversation

1. How long have you been familiar with the project site?
   August 2008 at the draft PP stage; I was not the RPM at the time.
2. What is your overall impression of the project?
   I wasn't familiar with the investigation they did, but I think it had a lot of metals in the ground because it was an open storage area before. They decided they can leave some in place because some is paved over and I think they have LUCs in place now.
3. Is the remedy functioning as expected? How well is the remedy performing?
   I think it is performing as expected.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No. However, Eric Shigaki indicated that there is no signature of the owner in the ROD. He also said the deed had no LUCs.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   Need to keep asphalt paving in good condition.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   None, except as noted in the response to question 5.

INTERVIEW RECORD

Site Name: Former Pearl City Junction **EPA RPM:** Christopher Lichens	**EPA ID No.:** HI4170090076
Subject: Five-Year Review Information Survey	**Time: 1025** | **Date: 11/12/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Christopher Lichens	**Title:** Regulatory Project Manager	**Organization:** EPA
Telephone No.: 415-972-3149 **Fax No.:** **E-Mail Address:** lichens.christopher@epa.gov	**Street Address:** 75 Hawthorne Street **City, State, Zip:** San Francisco, CA 94105	

Summary of Conversation

1. How long have you been familiar with the project site?
   About 4 years.
2. What is your overall impression of the project?
   This is now a non-navy property. I think the remedy is appropriate, but I do recall that there was property transfer since the remedy was implemented and I'm not sure how the LUCs transitioned.
3. Is the remedy functioning as expected? How well is the remedy performing?
   There is a potential concern about the property transfer that occurred.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No community concerns have been received. The issue regarding land transfers was conveyed by either attorneys or the Navy.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   Future LUC remedies with non-Navy properties are a concern. Property transfers and leases need to be covered for future residents and property owners.

INTERVIEW RECORD

Site Name: Former Pearl City Junction **Navy RPM:** Jan Kotoshirodo	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1026**	**Date: 11/15/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Jan Kotoshirodo	**Title:** Navy Project Manager	**Organization:** Navy
Telephone No.: 808-471-1171 ext. 341 **Fax No.:** — **E-Mail Address:** jan.kotoshirodo@navy.mil	**Street Address:** 400 Marshall Road **City, State, Zip:** JBPHH, HI 96860-3139	

Summary of Conversation

1. How long have you been familiar with the project site?
   March 2013.
2. What is your overall impression of the project?
   I think it's unique based on the current situation, since the Navy no longer owns the property. Real estate issues and the CERCLA requirements make it a little complicated.
3. Is the remedy functioning as expected? How well is the remedy performing?
   In terms of LUCs, it is functioning as expected.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities, including LUC inspections.
   Not that I know of.
6. Have there been unexpected costs or difficulties at the site in the last five years (or since the ROD was signed? Please provide details.
   The remedial action work plan hasn't been finalized or prepared yet, and that ties back to the challenges of us not owning the property.
7. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.
8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   No.
9. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   I'm not aware of any optimization for this site.
10. Do you have any comments, suggestions, or recommendations regarding the project?
    No.

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FIGURE

TABLES

ACRONYMS AND ABBREVIATIONS

µg/dL	microgram per deciliter
bgs	below ground surface
Bldg.	building
CIA	Controlled Industrial Area
COC	chemical of concern
DoD	Department of Defense
DOH	Department of Health, State of Hawaii
DRO	diesel range organic
EAL	environmental action level
EPA	Environmental Protection Agency, United States
FS	feasibility study
ft^2	square foot
HI	hazard index
IMF	Intermediate Maintenance Facility
JBPHH	Joint Base Pearl Harbor Hickam
LRO	lube oil range organic
LUC	Land Use Control
mg/kg	milligram per kilogram
mg/L	milligram per liter
NAVFAC	Naval Facilities Engineering Command
NPL	National Priorities List
O&M	operation and maintenance
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PHNC	Pearl Harbor Naval Complex
PHNSY	Pearl Harbor Naval Shipyard
RAB	Restoration Advisory Board
RAO	remedial action objective
RAWP	remedial action work plan
RI	remedial investigation
RME	reasonable maximum exposure
ROD	Record of Decision
RPM	remedial project manager
RSL	regional screening level
SI	site inspection
SRA	screening risk assessment
TCLP	toxicity characteristic leaching procedure
TPH	total petroleum hydrocarbons
UST	underground storage tank

1. Site Chronology

The Building (Bldg.) 6 site is a land use control (LUC) site in the Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) sites at Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii. Significant events relevant to this site are presented in Table 1-1.

Table 1-1: Bldg. 6 Site Chronology of Events

Event	Date of Event
The Bldg. 6 Foundry Shop was constructed to cast new or replacement parts for naval vessels. Foundry operations began during World War I (AECOM 2010).	1915
A facility assessment was performed and recommended investigation of several solid waste management units and areas of concern within Bldg. 6 (A.T. Kearney, Inc. 1987).	1987
Discolored soil was observed within an unpaved area of Bldg. 6 during excavation activities associated with the installation of new equipment. Sampling indicated that toxicity characteristic leaching procedure lead levels exceeded the 5.0 milligrams per liter regulatory limit in and around Bldg. 6 (Ogden 1998).	1993
A site inspection was conducted of the Bldg. 6 site as part of a larger investigation at Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility. Metals, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), total petroleum hydrocarbon (TPH)-gasoline range organics, and TPH-lube oil range organics were detected in surface and subsurface soil in Bldg. 6 and from an area adjacent to the southwest side of the building (Ogden 1998).	1995
Foundry operations ceased in 1997 (AECOM 2010).	1997
An expanded site inspection was conducted at the Bldg. 6 site, including 92 soil samples collected from 45 locations. PAHs, PCBs, and metals were detected in soil at concentrations exceeding screening criteria. Dissolved aluminum and PAHs were detected in groundwater at concentrations exceeding the 2002 United States Environmental Protection Agency Region 9 preliminary remediation goals (Earth Tech 2004).	2001
The remedial investigation/feasibility study (RI/FS) presented a revised human health screening risk assessment that concluded metals (primarily antimony, arsenic, and lead), PAHs, and PCBs in surface and subsurface soil could pose risk to potential future residents or industrial workers. The RI/FS recommended that a response action be conducted to ensure that unacceptable exposure for the worker and hypothetical future resident does not occur and to allow future industrial or commercial reuse of the building. No ecological risk was concluded.	2009-2010
Unpaved areas within Bldg. 6 were covered with plastic sheeting as interim protection from potential contact with contaminated soil (DON 2012).	2010
A record of decision was completed that recommended constructing a concrete cover over all unpaved areas within Bldg. 6 and implementing LUCs. The remedy included backfilling vaults and open pits with clean soil and placing a concrete cover over unpaved areas. LUCs would then be implemented to ensure the long-term integrity of the concrete cover through inspections and by placing institutional controls on the parcel of land occupied by Bldg. 6 that only allows commercial and/or industrial land use (DON 2012).	2012
A performance design package report provided the rationale and supporting engineering documentation to fill several subsurface vaults and to install a concrete cover over exposed areas of contaminated soil within Bldg. 6 (AECOM 2013b).	2013
A remedial action work plan (AECOM 2013b) was prepared to implement the remedial action, including backfilling vaults and pits, placing a concrete cover over unpaved areas, and implementing land use controls at Bldg. 6 (AECOM 2013b).	2013
An addendum to the remedial action work plan was prepared to describe the removal or securing of loose metal screens that posed a health and safety hazard to workers within the building (SESC 2013).	2013

2. Background

2.1 Site Description

Bldg. 6 is a 52,000-square foot (ft^2) building located within the Controlled Industrial Area (CIA) in the Pearl Harbor Naval Shipyard (PHNSY) & Intermediate Maintenance Facility (IMF) at JBPHH. The PHNSY & IMF comprises approximately 350 acres and is one of the six major components of the PHNC NPL listed under United States Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act Information System Number HI4170090076.

The CIA is a heavily industrial area that supports dry dock repair and maintenance activities for Navy surface vessels and submarines. Facilities for maintenance of Navy vessels, overhauls and retrofits, warehouse storage for spare and retrofitted parts, electronic repair, and metal and electronic fabrication are all located within the CIA. The areas outside and around Bldg. 6 are paved driveways, parking lots, and roadways.

Bldg. 6 has five parallel rows of columns supporting the structure. The majority of the building floor area is a patchwork of concrete paved areas with intermittent unpaved areas scattered throughout. These unpaved areas were typically located near furnaces. Historically, molten metals were transferred from the furnaces to molds held in place in the unpaved areas by a sand/clay mixture (DON 2012). During the transfer of the molten metal to the molds, metals may have been released to the sand/clay mixture and to the soil in unpaved areas. The largest unpaved area encompassed approximately 2,100 ft^2 in the central portion of the building and was used as a drip pit for molten metal-pouring activities. A subsurface concrete vault within the area was approximately 160 ft^2 in area and 8 feet in depth.

The north side of the building is lined with unoccupied offices, a restroom, a locker room, storage rooms, and workshops. Two active electrical substations are located inside Bldg. 6, one in the southwest corner of the building and one in the northeast corner of the building. A third active electrical substation is located outside of the north side of the building. Some equipment used in past foundry operations has been removed, but many furnaces and other equipment remain in place.

Access to the facility is strictly controlled. In addition, access to the PHNSY & IMF facilities is restricted to authorized personnel only, and security personnel at facility entrances and exits prevent unauthorized trespassing by civilians to the Bldg. 6 area.

Bldgs. 11, 12, and 315 are adjacent to Bldg. 6 to the north and west, and Seventh Street lies immediately to the east (Figure 1). Just south of Bldg. 6 is the hydroblast area, consisting of an unroofed area with a grated floor, a hydroblast equipment room, and a walled sand recovery pit.

2.2 Physical Characteristics

2.2.1 Topography

The topography of the area around Bldg. 6 slopes gently to the northwest toward the Pearl Harbor dry docks. The ground surface elevation within the Bldg. 6 study area is approximately 14 feet above mean sea level. The majority of the surface within the building is covered with concrete. There are numerous unpaved areas of various shapes and sizes within the building, including a 2,100-ft^2 area located in the eastern portion. The area immediately surrounding the building consists of asphalt-covered parking lots, driveways, and roads.

2.2.2 Geology and Soils

The PHNSY & IMF is located within the Coastal Plain geomorphic province on the island of Oahu. Regionally, the bedrock formations that underlie the coastal plain are composed primarily of fill, coral-reef limestones, and volcanically derived alluvial sediments. The coral-reef limestones also include calcareous beach-sand deposits, finely laminated lagoon limestones, and volcanic sediments.

The subsurface in the Bldg. 6 area is made up of artificial fill, marine sediments, volcanic tuff, and coralline limestone. Much of the land within the PHNSY & IMF is artificial fill created by the deposition of dredge spoils (Ogden 1992). The lithology observed in most boreholes from previous investigations graded from a sand/silt/clay mixture with coarse gravel to tuff at approximately 3.5 to 4.0 feet below ground surface (bgs). The tuff was grayish brown to brown, moderately weathered, and dry.

2.2.3 Groundwater Hydrology

Groundwater is shallow at the site, ranging from 11 to 13 feet bgs. This unconfined shallow groundwater is present within a sand and gravel layer at the contact between the volcanic tuff and the underlying coralline limestone. The shallow groundwater beneath PHNSY & IMF is tidally influenced (Ogden 1994), considered non-potable, and not hydraulically connected to the basal aquifer of Oahu. The source of shallow groundwater is believed to originate from infiltration of precipitation upgradient of the shipyard combined with intrusion of seawater from the harbor. As a result, the shallow groundwater is generally brackish. During a 2003 groundwater sampling event, a well-defined groundwater flow to the west and northwest was observed across the site. This northwesterly flow is in the general direction of the closest dry dock at Pearl Harbor and is consistent with regional groundwater flow directions (Ogden 1998).

2.3 LAND USE

Foundry operations ceased within Bldg. 6 in 1997. The shops and offices are also no longer in use. Some areas of the building are presently used for equipment storage, and three electrical substations remain in use within the building. No employees work within the building on a regular basis. Occasionally, Navy personnel are inside the building for maintenance and operation of the electrical substations and for access to the storage areas. The current land use designation is commercial/industrial. No change to land use is anticipated in the future. However, the Navy plans to use Bldg. 6 for storage since the unpaved areas within the building have been covered in concrete.

2.4 HISTORY OF CONTAMINATION

The Bldg. 6 Foundry Shop was constructed in 1915 to cast new or replacement parts for naval vessels. Foundry operations began during World War I and reached a peak during and shortly after World War II. More recently, foundry operations were limited to casting small replacement metal parts. Casting operations were conducted at multiple locations throughout Bldg. 6. Most of the foundry equipment is still in place; however, foundry operations ceased altogether in 1997.

In 1987, a facility assessment was performed at the PHNC that recommended investigation of several solid waste management units and areas of concern within Bldg. 6 (A.T. Kearney, Inc. 1987).

2.4.1 Investigation by Navy Personnel

Navy personnel conducted an investigation in 1993 after suspected contaminated soil was discovered during construction work within Bldg. 6. In February 1993, discolored soil was observed during excavation of the largest unpaved area in the eastern portion of the building, as part of construction work to install new equipment at the Foundry Shop. Initial sampling indicated that toxicity characteristic leaching procedure (TCLP) lead levels exceeded the 5.0 milligrams per liter (mg/L) regulatory limit in 4 of the 8 soil samples collected (Ogden 1998). An additional 36 soil samples were collected for total lead analysis. Of the additional 36 samples, 2 were collected from the former unpaved grassy area (which has since been paved), just outside of the southeast side of Bldg. 6 between columns 15 and 17; the rest were collected in and around the unpaved areas inside the building. The detected concentrations of total lead ranged from 24 milligrams per kilogram (mg/kg) to 9,550 mg/kg inside the building and from 99 to 1,305 mg/kg in the former unpaved grassy area just outside the building (Ogden 1998).

2.4.2 Site Inspection

In 1995, the Navy conducted a site inspection (SI) of three sites at the PHNSY & IMF. One of the investigations focused on the Bldg. 6 Foundry Shop, specifically the largest unpaved area inside the building and the former unpaved grassy area adjacent to the southwest side of the building (Ogden 1998).

- Metals were detected in all of the surface soil samples. The highest concentrations of metals detected in the surface soil appeared to be in specific hot-spot locations, including the grassy area outside Bldg. 6 and within the large unpaved interior sampling area.
- Polynuclear aromatic hydrocarbons (PAHs) were detected in all five samples analyzed for organic chemicals of potential concern. The highest concentrations of PAHs were detected on the south side of the large unpaved sampling area inside Bldg. 6.
- Polychlorinated biphenyls (PCBs) were detected in all five samples. The highest PCB concentrations were detected in the surface soil samples from the north side of the large unpaved sampling area inside Bldg. 6.
- Total petroleum hydrocarbons (TPH)-gasoline range organics and TPH-lube oil range organics (LRO) were detected in the surface soil samples from the northern portion of the large unpaved sampling area.

A total of 12 subsurface soil samples were collected from six soil borings drilled inside Bldg. 6 at depths ranging from 2 to 8 feet bgs. Two soil borings were also drilled approximately 40 feet north of Bldg. 6 and two borings were drilled approximately 20 feet south of Bldg. 6 to evaluate background concentrations.

- Lead, copper, and zinc were present in subsurface soils at concentrations generally an order of magnitude greater than those observed in the background borings.
- PAH concentrations in soil were significantly higher in subsurface soils than in surface soils in the large unpaved sampling area of Bldg. 6.
- PCB concentrations in subsurface soil samples were similar to those found in surface soils from the unpaved area of Bldg. 6, with the highest concentrations located in the northern portion of the large unpaved sampling area.
- TPH concentrations were higher in subsurface soil than in surface soils in the large unpaved sampling area of Bldg. 6.

Based on the analytical results of the soil sampling, the SI recommended further action because of elevated concentrations of lead.

2.4.3 Expanded SI

In 2001, the Navy collected surface and subsurface soil samples during an expanded SI. A total of 92 soil samples were collected from 45 locations:

- Five PAHs were detected in surface soil at concentrations exceeding both industrial and residential soil screening criteria: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. For the subsurface soil dataset, the same five PAHs as those found in surface soil samples exceeded screening criteria. Maximum concentrations of several PAHs were located in the large unpaved area at the eastern end of Bldg. 6.
- Two PCBs were detected in surface soil samples during the 2001 sampling effort: Aroclor 1254 and Aroclor 1260. These concentrations, however, did not exceed their respective risk-based screening criteria. The only PCB detection (Aroclor 1248) in the 2001 subsurface soil dataset occurred in a paved area at the eastern corner of Bldg. 6, near two large ovens and another set of drying ovens, but did not exceed any screening criteria.
- Metal concentrations in surface soil were higher than those detected in subsurface soil. For the 2001 dataset, metals exceeding industrial preliminary remediation goals (PRGs) occurred near equipment or in the large unpaved area at the eastern end of Bldg. 6.
- TPH-diesel range organics (DRO) and TPH-LRO concentrations were found to be higher in subsurface soil than in surface soil. TPH-DRO concentrations ranged from 11 to 13 mg/kg. TPH-LRO concentrations ranged from 35 to 250 mg/kg. These TPH detections were limited to the eastern end of Bldg. 6 near the oil furnaces and an unpaved area.

In 2002, the Navy collected additional surface soil and subsurface soil samples as part of the expanded SI. Seven soil samples were collected from four locations. All soil samples were surface and shallow subsurface soil samples (Earth Tech 2004).

- Benzo(a)pyrene in surface soil exceeded both industrial and residential screening criteria. The only other PAH exceedance in the 2002 dataset was for dibenz(a,h)anthracene, also in the furnace area in the western portion of Bldg. 6.
- Aroclor 1260 was the only PCB detected in any of the soil samples collected during the 2002 fieldwork. For shallow subsurface soil samples, Aroclor 1260 was detected in one sample from the unpaved area located north of an electrical substation (located in the southwestern corner of Bldg. 6) exceeding the residential screening criteria.
- The majority of the elevated metals concentrations detected in 2002 occurred in samples collected from the paved area at the western end of Bldg. 6, adjacent to a set of induction furnaces, the likely source of the metals contamination. When the metals concentrations in soil were compared to estimated background concentrations, several metals were found at Bldg. 6 within respective estimated background concentration ranges and were concluded not to reflect impacts from previous foundry operations. However, 13 metals (antimony, arsenic, barium, cadmium, cobalt, copper, lead, mercury, nickel, silver, thallium, vanadium, and zinc) did exceed the estimated background ranges.
- TPH-DRO and TPH-LRO concentrations were found to be higher in subsurface soil than in the surface soil (Earth Tech 2004).

Groundwater samples were collected from four previously installed wells and two new wells during the 2001 and 2002 Expanded SI. Groundwater samples were also collected from two existing underground storage tank (UST) wells located southeast of Bldg. 6, and one grab sample each of sediment and water was collected from both the sub-floor vault and pour pit. PAHs and dissolved aluminum were detected in groundwater at concentrations that exceeded 2002 EPA Region 9 PRGs. The dissolved aluminum exceedances, however, occurred only in one monitoring well (MW-01) located downgradient of Bldg. 6. The PAH exceedances included dibenz(a,h)anthracene, benzo(g,h,i)perylene, fluorine, and acenaphthene and only occurred in wells that also contained TPH-DRO and TPH-LRO for which the source appeared to be upgradient of Bldg. 6 (i.e., leaks from the former UST or other upgradient petroleum sources). PCBs were not detected in any of the groundwater samples collected.

2.4.4 Remedial Investigation and Feasibility Study

A remedial investigation/feasibility study (RI/FS) was conducted in 2009/2010 to determine whether further action is required for the Bldg. 6 site. The RI/FS was initiated to resolve data gaps identified in the Expanded SI report (Earth Tech 2004). The scope of the RI included collecting additional groundwater samples, re-evaluating risks to human health and ecological receptors, and further evaluating the site incorporating results from previous investigations. Because human health risks were determined to be unacceptable, the FS was conducted to develop and evaluate remedial alternatives, and recommend a remedial alternative that, if implemented, will reduce, control, or mitigate unacceptable risks.

Two rounds of groundwater samples were collected to establish the current concentration of dissolved vanadium at the site and evaluate how the current data compare with previously collected data from 2001 and 2002. The previous investigations identified elevated concentrations of PAHs and metals in the groundwater, which were attributed to upgradient sources. However, during the RI, the groundwater concentrations were compared to State of Hawaii Department of Health (DOH) environmental action levels (EALs) (DOH 2011). As a result of this comparison, the EPA and DOH agreed that the only remaining concern for groundwater was vanadium, and determined that more information was necessary to accurately characterize dissolved vanadium in groundwater at the Bldg. 6 site.

One groundwater sampling round was conducted during the 2009 “dry season” and one round during the 2010 “wet or rainy season” to determine whether seasonal variability affected the concentration of dissolved vanadium present beneath the Bldg. 6 site. Groundwater samples were collected at eight wells in and around Bldg. 6. Dissolved vanadium was detected in all eight wells sampled. The DOH EAL of 19 micrograms per liter was exceeded at six wells (MW-01, MW-02, MW-03, MW-04, MW-06, and UST MW-08), and dissolved vanadium concentrations were similar to concentrations detected in 2001 and 2002. The reported concentrations of vanadium over several monitoring events indicated that vanadium in groundwater is stable. In addition, the regulators concurred that concentrations of vanadium observed in the groundwater are likely attributable to background concentrations reflected by the vanadium concentrations naturally occurring in volcanic soils such as those found under Bldg. 6. Therefore, the RI recommended no further action for groundwater.

Risks to human health and ecological receptors were re-evaluated by initially screening historical data with the 2007 DOH Tier 1 EALs and Oahu-wide background concentration ranges for metals. Chemicals that exceeded both background (metals only) and risk-based screening levels were further evaluated in a revised human health screening risk assessment (SRA). The results of the SRA concluded that metals (primarily antimony, arsenic, and lead), PAHs, and PCBs in surface and subsurface soil could pose a risk to potential future residents or industrial workers. TPH-DRO and LRO were also detected at concentrations exceeding the DOH EAL. Because contaminants exceeding industrial cleanup goals are present in surface soils, the RI recommended that a response action be conducted to ensure that unacceptable worker and hypothetic future resident exposure does not occur and to allow future industrial or commercial reuse of the building. Proper closure of the vaults and pit were also recommended for worker safety, to prevent potential future exposure to contaminants in residual water (if present) or sediment, and to eliminate a potential source of soil or groundwater contamination should cracks develop in the vault or pit in the future.

The ecological risk assessment concluded that chemicals detected pose no threat to wildlife or ecology because the contaminated soil is contained within a closed building, which is surrounded by a paved area, and dispersion and natural attenuation would occur along the potential offsite transport pathways (e.g., groundwater flow, storm water runoff, and wind transport).

2.4.5 Other Investigations

A SI (Earth Tech 2003) was conducted to investigate several Navy transformer sites on Oahu, Hawaii (Earth Tech 2003). Concrete and soil samples were collected at Transformer E-13 (an electrical substation located in the northeast corner of Bldg. 6). The concrete samples were all non-detect for PCBs; however, soil samples collected immediately below the asphalt adjacent to Transformer E-13 were found to contain PCB concentrations above the Toxic Substances Control Act screening criterion of 1 mg/kg. The SI recommended further evaluation of this transformer site, which is being conducted under the Navy Comprehensive Long-Term Environmental Action Navy III contract, contract task order HC42 (AECOM 2011) for the base-wide PCB program. The Navy will coordinate the projects to ensure that the remedies for Bldg. 6 and the base-wide PCB program will not conflict with each other, and that all remedies implemented will be protective of human health and the environment.

2.5 INITIAL RESPONSE

2.5.1 Navy Maintenance and Cleanup

After foundry operations ceased, Navy personnel conducted a housekeeping effort in 1998, which was limited to removing dust from floors and surfaces, and covering the interior unpaved areas with plastic sheeting. Surface soil and floor-dust sweep samples were collected and analyzed for TCLP lead. Analytical results indicated leachable lead concentrations above the 5.0 mg/L hazardous waste regulatory limit in many areas of the building. In addition, under a time-critical removal action completed in 1998 to address environmental concerns in the catch basins at Bldg. 6, the Navy also removed and disposed of approximately 0.5 cubic yard of contaminated sediment from two catch basins associated with storm drains on the southeast side of Bldg. 6. Furthermore, the unpaved grassy area just outside of Bldg. 6 was paved over with concrete to prevent soil from entering the storm drains. A third feature, previously identified on facility drawings as a storm drain, was found to be a utility vault that did not receive discharges from the foundry operations. The removal action activities are documented in an action memorandum (DON 1998).

2.6 BASIS FOR TAKING REMEDIAL ACTION

As described in the record of decision (ROD) (DON 2012), the ecological risk assessment concluded that chemicals detected in soil and groundwater pose no threat to wildlife or ecology because the contaminated soil is contained within a closed building, which is surrounded by paved areas, and dispersion and natural attenuation would occur along the potential offsite transport pathways (e.g., groundwater flow, storm water runoff, and wind transport).

The following points summarize the human health SRA from exposure to surface and subsurface soils.

- Estimated cancer risk from exposure to surface and subsurface soil exceeds the target risk range of 10^{-6} to 10^{-4} for the resident but not the industrial/commercial worker or construction/utility worker. This risk is driven primarily by the presence of arsenic.
- Noncancer hazards for both surface and subsurface soils exceeded the target hazard index (HI) of 1 for all receptors. Target organ segregation resulted in organ-specific HIs that still exceeded the target of 1. While antimony, arsenic, and PCBs were the main contributors to this hazard in surface soil, antimony is the main contributor in subsurface soil.
- Maximum concentrations and average concentrations (or exposure point concentrations) of lead in surface soil and subsurface soil exceeded both the residential regional screening level (RSL) of 400 mg/kg and the industrial RSL of 800 mg/kg. For the construction/utility worker, blood lead levels were estimated and, for the evaluation of a theoretical pregnant worker, were compared to the EPA screening value of 10 micrograms per deciliter (µg/dL) for children. While exposure to the maximum and average lead concentrations in surface soil resulted in blood lead levels in excess of 10 µg/dL, only exposure to the maximum concentration in subsurface soil resulted in blood lead levels that exceeded this criterion. Exposure to average lead concentrations in subsurface soil produced a blood lead estimate below 10 µg/dL.
- Results of indoor air exposure to volatile chemicals from soil initially suggest a noncancer hazard that exceeds 1; however, this estimate is based on a single high detection of 2-methylnaphthalene in subsurface soil. An average concentration (closer to the chemical reporting limit) would likely produce an expected noncancer hazard that is less than 1.

Because of the protective nature of the risk assessment process, cancer risks and noncancer hazards are likely overestimated. The main reasons include the conservative manner in which toxicity values are derived, the presumed high bioavailability of arsenic (main risk driver), and conservative assumptions about exposure factors for each receptor evaluated.

The response action selected in the ROD is necessary to protect public health, welfare, and the environment from actual or threatened releases of hazardous substances into the environment. Soils at the Bldg. 6 site with contaminant concentrations exceeding the DOH-approved cleanup goals were temporarily covered. However, additional response action was required to implement a permanent remedy at the site. Previous site investigations and risk assessment calculations identified the chemicals of concern and associated PRGs for the Bldg. 6 site (Table 2-1). The results were documented in the ROD (DON 2012).

Table 2-1 : Soil COCs and PRGs for Bldg. 6

Chemical of Concern	Maximum Detected Concentration	DOH Tier 1 EAL	Residential PRG [a]/RSL [b]	Industrial PRG [a]/RSL [b]	Estimated Background Range
Surface Soil (mg/kg)					
Antimony	445	20	31/31	410/410	0.12-8.4
Arsenic	539	20	0.39(22)/0.39	1.6(260)/1.6	0.21-29
Barium	1,450	750	5,400/15,000	67,000/190,000	5-834
Chromium	263	500	210 (total)/n/a	450/n/a	2.6-321
Cobalt	120	40	900/23	1,900/300	0.71-94
Copper	11,600	230	3,100/3,100	41,000/41,000	1.8-230
Iron	121,000	400	23,000/55,000	100,000/720,000	1,300-140,000
Lead	247,000	200	400 (total)/400	800/800	0.19-40
Mercury	17 J	10	23/23	310/310	0.0035-0.35
Nickel	539	150	1,600/1,500	20,000/20,000	1.64-353

Chemical of Concern	Maximum Detected Concentration	DOH Tier 1 EAL	Residential PRG [a]/RSL [b]	Industrial PRG [a]/RSL [b]	Estimated Background Range
Silver	208 J	20	390/390	5,100/5,100	0.03-1.0
Vanadium	264 J	78	78/5.5	1,000/72	1.4-249
Zinc	1,990	600	23,000/23,000	100,000/310,000	1.6-193
Benzo(a)anthracene	4.6	6.2	0.62/0.15	2.1/2.1	NA
Benzo(a)pyrene	6.8	0.62	0.062/0.015	0.21/0.21	NA
Benzo(b)fluoranthene	8.1	6.2	0.62/0.63	2.1/2.4	NA
Benzo(k)fluoranthene	5.1	37	6.2/1.5	21/21	NA
Dibenzo(a,h)anthracene	1.7 J	0.62	0.062/0.015	0.21/0.21	NA
Indeno(1,2,3-cd)pyrene	3.7	6.2	0.62/0.15	2.1/2.1	NA
Aroclor 1260	5.1	1.1	0.22/0.22	0.74/0.74	NA
Subsurface Soil (mg/kg)					
Antimony	2,490	20	31/31	410/410	0.12-8.4
Arsenic	19.9	20	0.39(22)/0.39	1.6(260)/1.6	0.21-29
Barium	1,270	750	5,400/15,000	67,000/190,000	5-834
Chromium	379	500	210 (total)/n/a	450/n/a	2.6-321
Cobalt	92.7	40	900/23	1,900/300	0.71-94
Copper	27,600 J	230	3,100/3,100	41,000/41,000	1.8-230
Iron	116,000	400	23,000/55,000	100,000/720,000	1,300-140,000
Lead	2,000	200	400 (total)/400	800/800	0.19-40
Manganese	2,580	n/a	1,800/1,800	19,000/23,000	25-3,470
Nickel	1,230	150	1,600/1,500	20,000/20,000	1.64-353
Vanadium	199 J	78	78/5.5	1,000/72	1.4-249
Zinc	11,900 J	600	23,000/23,000	100,000/310,000	1.6-193
TPH-DRO	18,000	5,000	NA	NA	NA
TPH-LRO	27,600	5,000	NA	NA	NA
Benzo(a)anthracene	1.0 J	6.2	0.62/0.15	2.1/2.1	NA
Benzo(a)pyrene	1.5J	0.62	0.062/0.015	0.21/0.21	NA
Benzo(b)fluoranthene	2.1	6.2	0.62/0.63	2.1/2.4	NA
Dibenz(a,h)anthracene	0.36	0.62	0.062/0.015	0.21/0.21	NA
Indeno(1,2,3-cd)pyrene	0.81 J	6.2	0.62/0.15	2.1/2.1	NA
Aroclor 1260	0.32	1.1	0.22/0.22	0.74/0.74	NA

Source: AECOM 2010.
J estimated
NA not available
[a] 2004 EPA PRG.
[b] 2010 EPA RSL.

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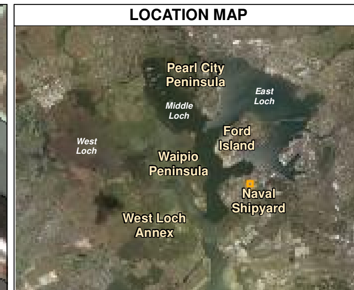
LOCATION MAP



LEGEND

- Building 6 Monitoring Well Location
- Area Covered With Concrete
- Land Use Control Boundary
- Building 6
- Existing Building
- Road

NOTES

1. Map Projection: UTM NAD83 Zone 4
2. Base Map Orthophoto: Earth Data, USGS Hawaii Data Clearinghouse.
3. Monitoring well and unpaved area locations are approximate

N

0 50 100 Feet

Figure 1
Building 6 Site Location Map
First Five-Year CERCLA Review of
Seven PHNC NPL Sites
PHNC NPL Site
JBPHH, Oahu, Hawaii

3. Remedial Actions

A ROD was signed in 2012 that specified the installation of a concrete cover over all unpaved areas within Bldg. 6 and the implementation of LUCs, including long-term monitoring, for the Bldg. 6 site at JBPHH (DON 2012).

3.1 REMEDIAL ACTION OBJECTIVES

The principal remedial action objective (RAO) for the Bldg. 6 site is to reduce or eliminate risk to human health under continued industrial or future commercial land use scenarios. Industrial and commercial land uses are the reasonably anticipated land uses for Bldg. 6 for the foreseeable future.

The RAO will be achieved by containment of contaminants beneath a concrete cover and long-term management of the site with LUCs. The cover will prevent most potential receptors from exposure to contaminants in the subsurface and eliminates the potential for soil erosion and sedimentation. LUCs will limit land use and serve to protect personnel involved with intrusive activities that breach the cover and expose the soil by providing advanced warning of the presence of contaminated soil.

3.2 REMEDY DESCRIPTION

The ROD identified LUCs, including containment (cover) and long-term management as the final remedy for the Bldg. 6 site. The selected remedy includes backfilling vaults and pits with clean soil and placing a concrete cover over unpaved areas within Bldg. 6. Because the highest concentrations of contaminants exceeding industrial screening criteria are located in exposed surface soils, a concrete cover over the affected unpaved areas, vaults, and pits would significantly reduce the potential for exposure to contaminants and would allow for future industrial or commercial use of Bldg. 6. LUCs will be implemented to ensure the long-term integrity of the surface cover through inspections and to ensure that risks to human health remain acceptable by placing restrictions on the parcel of land occupied by Bldg. 6 that restricts land use to commercial and/or industrial uses. LUCs ensure that human health risks/hazards from the COCs remain acceptable by prohibiting residential land use at Bldg. 6 and barring activities/operations that would compromise the integrity of the concrete cover and expose the underlying soil. LUCs will fulfill the RAO as follows:

- Prohibits unauthorized digging, disturbance of site soil, or any other land modifications that could potentially expose contaminated soil
- Prohibits unauthorized excavation, construction, and uncontrolled soil removal without proper handling and disposal, and prevents migration or relocation of contaminated soil to areas where human or ecological exposure could occur
- Prohibits development or use of the property for residential housing, recreational activities, elementary or secondary school facilities, long-term care facilities, or child day care facilities

3.3 REMEDY IMPLEMENTATION

A remedial action work plan (RAWP) (AECOM 2013b) was prepared to implement the remedial action, including backfilling vaults and pits, placing cover over unpaved areas, and implementing LUCs at Bldg. 6. This RAWP included the following elements:

- Decommission six existing onsite monitoring wells (BLDG6-MW01 through BLDG6-MW06).
- Place concrete cover over all unpaved areas inside Bldg. 6, including soil removal as necessary to match existing grade.

- Fill and cover vaults inside Bldg. 6, and remove or temporarily relocate existing equipment as necessary.
- Install signage along LUC boundaries.
- Place and monitor the following institutional (legal) controls in the LUC Tracker application in the Naval Installation Restoration Information Solution:
  - Land use restrictions to prohibit excavation without prior planning and proper use of safety equipment
  - Notice of site contamination and land use restrictions
  - Right of access for purposes of site inspection and further response action, if necessary

At the time of the 2014 site visit, all unpaved areas were covered in concrete. Warning signs were posted at various entries around the building. However, the monitoring wells were observed still in place.

3.4 SYSTEMS OPERATIONS AND MAINTENANCE

Except for compliance monitoring, the Bldg. 6 site does not have any operation and maintenance (O&M) costs.

According to the remedial project manager (RPM), no significant cost variances indicative of potential problems were identified with regards to the O&M costs.

4. Progress since the Last Five-Year Review

This is the first five-year review for the Bldg. 6 site; consequently, there is no progress to report.

5. Five-Year Review Process

5.1 Administrative Components

The public was notified of the initiation of this five-year review in July 2013. The five-year review team members are listed in Table 5-1.

Table 5-1: Five-Year Review Team Members

DOH	Regulatory Project Manager: Maria Reyes/Wendy Ray
DON	RPM for five-year review: Jan Kotoshirodo
	RPM for specific site: Joel Narusawa
EPA	Regulatory Project Manager: Christopher Lichens
AECOM	Project Manager: Dean Baxley
	Deputy Project Manager: Teresa Quiniola
	Project Support: Dustin Goto, Andrea VonBurg Hall

AECOM AECOM Technical Services, Inc.
DON Department of the Navy

The team members established a review schedule of May to December 2013, during which they performed community involvement activities related to the current five-year review, reviewed relevant documents and data, inspected the site, and interviewed the site project manager and regulators.

5.2 Document Review

This five-year review includes a review of relevant documents, including O&M records, the ROD, remedial investigations, feasibility studies, risk assessments, WPs, remedial designs, completion reports, long-term monitoring and operation reports, LUC inspection reports, monitoring data, and various compliance reports. The specific list of documents reviewed is provided in Section 9. Applicable cleanup standards, as listed in the ROD, were reviewed. Applicable or relevant and appropriate requirements and to be considered criteria that may have changed since the ROD was completed were also evaluated; however, no changes were noted, except changes to DOH Tier 1 EALs (DOH 2011) and EPA RSLs (EPA 2010). Changes to the PRGs and current screening criteria are evaluated further in Section 6.

5.3 Data Review

No data for the site has been collected since the ROD was published in 2012.

The remediation verification report is expected to be published in 2014 to document the construction of the concrete cap at Bldg. 6 and implementation of institutional controls.

5.4 Site Inspection

A five-year review site inspection at Bldg. 6 was conducted on 9 January 2014 to assess the operations and effectiveness of LUCs at the site. During the site visits, the weather was sunny and the temperature averaged in the low 70 degrees Fahrenheit. As observations were made, a five-year review site inspection checklist was completed to document the status of the site (see Attachment A).

No significant issues were identified regarding the LUC areas. Locked gates prevented access to the building, which is located in the highly restricted CIA area. The gates along Seventh Street were observed to be welded shut. Signs located at the northwest and north entrances to the building indicated that lead hazards are present within the building. A sign on the southeast end fence indicated the site is within a restricted area. Concrete covers were observed in the areas as indicated in the Site Remedial Plan (AECOM 2013a). No areas of bare soil were observed within the LUC area. The six groundwater monitoring wells installed as part of the site investigation were observed in place.

Photographs obtained during the site visit are presented in Attachment B.

5.5 INTERVIEWS

Interviews were conducted with the following personnel:

Name	Affiliation	Date
Maria Reyes	DOH, Regulatory Project Manager	14 November 2013
Christopher Lichens	EPA, Regulatory Project Manager	12 November 2013
Joel Narusawa	NAVFAC Hawaii, RPM	6 January 2014

NAVFAC Naval Facilities Engineering Command

All personnel agreed that the remedy is or will be protective, but at the time of the regulatory project manager interviews, the concrete covers and LUC signage had not yet been installed and wells had not yet been decommissioned. However, no complaints or community concerns had been received, except an issue associated with loose roofing panels causing a health and safety hazard. The Naval Facilities Engineering Command, Hawaii RPM indicated that several delays with constructing the remedy have occurred for various reasons, including the repair of the roof panels, but that the remedy was being implemented and was progressing well.

Interview forms are presented in Attachment C.

6. Technical Assessment

Answers to the following three key technical questions are presented in tabular format below:

- A: Is the remedy functioning as intended by the decision documents?
- B: Are the assumptions used at the time of remedy selection still valid?
- C: Does any other information call into question the protectiveness of the remedy?

A review of the conceptual site model for the Bldg. 6 site indicated no significant changes to land use or site conditions have occurred that would affect the remedy effectiveness. However, based on the concrete cap placed over the contaminated soil within Bldg. 6, the exposure pathway to contaminated soil is now incomplete.

SITE: BLDG. 6
QUESTION A: Is the remedy functioning as intended by the decision documents?

Element	Assessment
Remedial Action Performance	The final remedy implemented at the Bldg. 6 Site is LUCs, including containment (concrete cap) and long-term management. LUCs are the non-technical and non-engineering actions that will help mitigate potential risks to human health and the environment by restricting access to contaminated media. The current industrial land use at Bldg. 6 will be maintained to reduce the possibility of exposure to constituents under other land use scenarios. Maintenance of the concrete cap prevents direct contact of underlying contaminated soil and the relocation of contaminated soil to areas where human or ecological exposure could occur.
System Operations/O&M	No active systems or monitoring is currently in place at Bldg. 6.
Cost of Systems Operations/O&M	No cost variances were identified that suggest the remedy is not properly functioning.
Opportunities for Optimization	No opportunities for optimization were identified for Bldg. 6.
Early Indicators of Potential Remedy Failure	The remedy is functioning as intended. No early indicators of potential remedy failure were noted in the review, except that LUC warning signs have not been installed as of the date of this report and wells still needed to be decommissioned.
Implementation of Institutional Controls and Other Measures	Signs indicating that lead contamination is present within the building were observed at the northwest and north entrances of the building. Access to the Bldg. 6 site was controlled by Code 106 personnel. However, site-specific LUC signage has not been installed. JBPHH is a secure facility, and entry is restricted and vigorously enforced, especially within the CIA area where Bldg. 6 is located. Administrative processes and procedures that require approval for all projects involving construction or digging and subsurface disturbance are in place. These procedures involve coordination and approval by NAVFAC Hawaii environmental personnel for projects located in or near an environmental restoration site, to include sites that have LUCs. The Navy will ensure that these or similar processes and procedures remain in place and are followed for all proposed construction, digging, and or other activities that could disturb subsurface soil beneath the concrete cap at the site.

SITE: BLDG. 6 **QUESTION B: Are the assumptions used at the time of remedy selection still valid?**	
Element	**Assessment**
Changes in Standards and TBC Requirements	Regulatory requirements were considered in the selection of the final remedy. Changes in screening criteria and toxicity are discussed below.
Changes in Exposure Pathways and Land Use	No change in land use has occurred at Bldg. 6 which is still in an area used only for industrial purposes. At the time of the ROD it was visited infrequently for maintenance purposes. However, in the near future it is anticipated that the site will be used for storage purposes and people may be working there on a regular basis. The site is expected to be used for only industrial purposes in the future.
Changes in Toxicity and Other Contaminant Characteristics	Table 6-1 compares the EPA RSLs (EPA 2013) used in evaluating the original risk estimates with the May 2012 EPA RSLs (EPA 2013) for Bldg. 284. With the exception of Aroclor 1260, Aroclor 1254, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, mercury, thallium, pyrene, benzo(k)fluoranthene, chrysene, fluorene, and naphthalene, the May 2013 RSLs for each of the COCs are equal to or greater than the previous PRGs (EPA 2013). The MDCs within the LUC area for some metals and PAHs exceeds the May 2013 RSLs, background concentrations, and the acceptable risk range. Therefore, the concrete cover at Bldg. 6 is necessary to prevent potential exposure of humans to unacceptable concentrations of metals and PAHs. Remedial actions include implementation of LUCs and maintenance of concrete covers, which are protective of the industrial worker. Therefore, the changes to the RSLs do not affect the RAOs, which limit use of the site to industrial or commercial use. Thus, it is not necessary to update the standards used at the time of remedy selection.
Changes in Risk Assessment Methodologies	Changes in risk assessment methodologies since the time the 2004 risk assessment was prepared include changes in the estimation of risk from exposure to chemicals via inhalation. However, the risk assessment performed for the RI (AECOM 2010) evaluated the indoor air exposure to volatile chemicals from soil and groundwater and concluded that the site is protective of industrial workers. Therefore, these changes do not call into question the protectiveness of the remedy for Bldg. 6 because the LUCs restrict use to industrial/commercial activities. Human health risk at this site has been addressed by capping the areas with concrete.
Remedy Byproducts	No remedy byproducts have been identified to consider in this assessment.
New Contaminants and Contaminant Sources	No new contaminants or contaminant sources have been identified.
Expected Progress Toward Meeting RAOs	No change has occurred in the physical condition of Bldg. 6 that would affect the protectiveness of the remedy, except that areas of bare soil have been covered in concrete to provide a protective cover that limits human exposure to contaminated soil. Exposure assumptions, toxicity data, cleanup levels, and the RAOs remain valid for the selected remedy. The RAOs for Bldg. 6 sites is still appropriate.

TBC to be considered

Table 6-1: Review of Human Health Toxicity Data Used in Risk Assessment Bldg. 6

Detected Analyte	MDC [a] within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Residential Cancer Risk [b] Based on Current PRG and MDC	Residential Noncancer HI [c] Based on Current PRG and MDC	Conclusion
COCs											
Antimony	2,490	31	Yes	31	Noncancer	Yes	8.4	Yes	NA	8.0E+01	MDC still exceeds PRG and background; current risk is above acceptable non-cancer hazard of 1.
Arsenic	539	0.39	Yes	0.61	Cancer	Yes	29	Yes	8.8E-04	NA	MDC still exceeds PRG and background; current risk is above acceptable cancer risk range of 1E-04 to 1E-06.
Copper	27,600	3,100	Yes	3,100	Noncancer	Yes	230	Yes	NA	8.9E+00	MDC still exceeds PRG and background; current risk is above acceptable non-cancer hazard of 1.
Iron	116,000	23,000	Yes	55,000	Noncancer	Yes	140000	No	NA	2.1E+00	Although the MDC exceeds the current PRG, it is lower than background levels.
Lead	105,000	400	Yes	400	Noncancer	Yes	40	Yes	NA	2.6E+02	MDC still exceeds PRG and background; current risk is above acceptable non-cancer hazard of 1.
Vanadium	215	78	Yes	390	Noncancer	No	249	No	NA	5.5E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Aroclor 1260	5.1	0.74	Yes	0.22	Cancer	Yes	NA	NA	2.3E-05	NA	MDC still exceeds PRG and background; current risk is within the acceptable cancer risk range of 1E-04 to 1E-06.
Benzo(a)anthracene	3.2	0.62	Yes	0.15	Cancer	Yes	NA	NA	2.1E-05	NA	MDC still exceeds PRG and background; current risk is within the acceptable cancer risk range of 1E-04 to 1E-06.
Benzo(a)pyrene	5.1	0.062	Yes	0.015	Cancer	Yes	NA	NA	3.4E-04	NA	MDC still exceeds PRG and background; current risk is the acceptable cancer risk range of 1E-04 to 1E-06.
Benzo(b)fluoranthene	5.8	0.62	Yes	0.15	Cancer	Yes	NA	NA	3.9E-05	NA	MDC still exceeds PRG and background; current risk is within the acceptable cancer risk range of 1E-04 to 1E-06.
Dibenz(a,h)anthracene	1.7	0.062	Yes	0.015	Cancer	Yes	NA	NA	1.1E-04	NA	MDC still exceeds PRG and background; current risk is the acceptable cancer risk range of 1E-04 to 1E-06.

Detected Analyte	MDC [a] within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Residential Cancer Risk [b] Based on Current PRG and MDC	Residential Noncancer HI [c] Based on Current PRG and MDC	Conclusion
Indeno(1,2,3-cd)pyrene	3.7	0.62	Yes	0.15	Cancer	Yes	NA	NA	2.5E-05	NA	MDC still exceeds PRG and background; current risk is within the acceptable cancer risk range of 1E-04 to 1E-06.
Detected COPCs											
Aluminum	74,200	76,000	No	77,000	Noncancer	No	76700	No	NA	9.6E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Barium	1,450	5,400	No	15,000	Noncancer	No	834	Yes	NA	9.7E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Beryllium	3.15	150	No	160	Noncancer	No	3.3	No	NA	2.0E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Cadmium	10	37	No	70	Noncancer	No	3	Yes	NA	1.4E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Calcium	355,000	NA	No	NA	NA	No	NA	NA	NA	NA	There is no available risk criteria to evaluate.
Chromium	379	210	Yes	12,000	Noncancer	No	321	Yes	NA	3.2E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Cobalt	177	900	No	23	Noncancer	Yes	94	Yes	NA	7.7E+00	MDC still exceeds PRG and background; current risk is above acceptable non-cancer risk of 1.
Magnesium	44,100	NA	No	NA	NA	No	NA	NA	NA	NA	There is no available risk criteria to evaluate.
Manganese	2,730	1,800	Yes	1,800	Noncancer	Yes	3470	No	NA	1.5E+00	Although the MDC exceeds the current PRG, it is lower than background levels.
Mercury	17	23	No	10	Noncancer	Yes	0.35	Yes	NA	1.7E+00	MDC still exceeds PRG and background; current risk is above acceptable non-cancer risk of 1.
Nickel	2,213	1,600	Yes	1,500	Noncancer	Yes	353	Yes	NA	1.5E+00	MDC still exceeds PRG and background; current risk is above acceptable non-cancer risk of 1.
Potassium	9310	NA	No	NA	NA	No	NA	NA	NA	NA	There is no available risk criteria to evaluate.

Detected Analyte	MDC [a] within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Residential Cancer Risk [b] Based on Current PRG and MDC	Residential Noncancer HI [c] Based on Current PRG and MDC	Conclusion
Selenium	4.3	390	No	390	Noncancer	No	11	No	NA	1.1E-02	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Silver	208	390	No	390	Noncancer	No	1	Yes	NA	5.3E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Sodium	19,500	NA	No	NA	NA	No	NA	NA	NA	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Thallium	4.4	5.2	No	0.78	Noncancer	Yes	3	Yes	NA	5.6E+00	MDC still exceeds PRG and background; current risk is above acceptable non-cancer risk of 1.
Zinc	11,900	23,000	No	23,000	Noncancer	No	193	Yes	NA	5.2E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Aroclor 1248	0.0016	0.22	No	0.22	Cancer	No	NA	NA	7.3E-09	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Aroclor 1254	0.026	0.74	No	0.22	Cancer	No	NA	NA	1.2E-07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Pyrene	2.6	2,300	No	1,700	Noncancer	No	NA	NA	NA	1.5E-03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Benzo(k)fluoranthene	5.1	6.2	No	1.5	Cancer	Yes	NA	NA	3.4E-06	NA	MDC still exceeds PRG and background; current risk associated with the MDC is acceptable.
Benzo(g,h,i)perylene	2.4	NA	No	NA	NA	No	NA	NA	NA	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Chrysene	3.5	62	No	15	Cancer	No	NA	NA	2.3E-07	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Fluoranthene	2.5	2,300	No	2,300	Noncancer	No	NA	NA	NA	1.1E-03	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Fluorene	0.0056	2,700	No	2,300	Noncancer	No	NA	NA	NA	2.4E-06	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Detected Analyte	MDC [a] within LUC Area (mg/kg)	Original Residential PRG (mg/kg)	Does MDC Exceed Original PRG?	Current Residential PRG (mg/kg)	Current Residential PRG Basis	Does MDC Exceed Current PRG?	Background Concentration (mg/kg) (Metals only)	Does MDC Exceed Background?	Residential Cancer Risk [b] Based on Current PRG and MDC	Residential Noncancer HI [c] Based on Current PRG and MDC	Conclusion
2-methylnaphthalene	50	NA	No	230	Noncancer	No	NA	NA	NA	2.2E-01	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Naphthalene	0.14	56	No	3.6	Cancer	No	NA	NA	3.9E-08	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.
Phenanthrene	24	NA	No	NA	NA	No	NA	NA	NA	NA	The MDC does not exceed the current PRG and risk associated with the MDC is acceptable.

Sources: MDCs (AECOM 2010), Original PRGs (EPA Region 9 2004), Background (Earth Tech 2006), Current PRGs (EPA 2013).
COPC chemical of potential concern
NA not available
[a] MDC values from remedial investigation risk assessment tables.
[b] Industrial cancer risk is derived using the following equation: (MDC/Current PRG) x (target risk level [1E-06]).
[c] Industrial non-cancer HI is derived using the following equation: (MDC/Current PRG) x (target hazard quotient [1]).

SITE: BUILDING 6 QUESTION C: Does any other information call into question the protectiveness of the remedy?	
Element	**Assessment**
Overall	No information that would call into question the protectiveness of the remedy has been identified.

7. Issues, Recommendations, and Follow-up Actions

Issues identified during the site inspection and interviews are listed in Table 7-1.

Table 7-1: Issues and Recommendations for the Bldg. 6 Site

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Affects Protectiveness? (Y/N)	
				Current	Future
LUC warning signs were not installed as of the date of this report and groundwater monitoring wells still needed to be decommissioned.	LUC warning signs should be installed and groundwater monitoring wells no longer in use at the site should be decommissioned.	Navy	EPA/DOH	N	Y

8. Protectiveness Statement

The remedy at the Bldg. 6 site, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.

No changes in land use are expected in the foreseeable future.

9. References

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Attachment A: Five-Year Review Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. “N/A” refers to “not applicable.”

I. SITE INFORMATION	
Site Name: Building 6	**Date of Inspection:** 09 January 2014
Location and Region: Honolulu, HI	**EPA ID:** HI4170090076
Agency, office or company leading the five-year review: NAVFAC Hawaii /AECOM	**Weather/temperature:** Overcast, low 70s °F
Remedy Includes: (Check all that apply) ☐ Landfill cover/containment ☒ Access controls ☒ Institutional controls ☐ Groundwater pump and treatment ☐ Surface water collection and treatment ☒ Other – LUCs (concrete cover)	
Attachments: ☐ Inspection team roster attached Inspection Team Members: Louann Kromer (AECOM) Teresa Quiniola (AECOM)	☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** ☒ N/A
2. **O&M Staff** ☒ N/A

3. Local regulatory authorities and response agencies (i.e.; State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency Hawaii Department of Health

Contact	Name	Title here	Date	Phone Number
	Maria Reyes	Regulatory Project Mgr.	14 November 2013	808-586-4653

Agency EPA Region 9

Contact	Name	Title here	Date	Phone Number
	Christopher Lichens	Regulatory Project Mgr.	12 November 2013	415-972-3149

Problems, suggestions: ☒ Report attached (Refer to Attachment C)
Remarks:

4. Other interviews (optional) ☒ Report attached to Five-Year Review Report (Refer to Attachment C)

Joel Narusawa, NAVFAC RPM (06 January 2014)

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1. O&M Documents	☒ Readily available	☒ Up to date	☐ N/A
2. Site-Specific Health and Safety Plan	☐ Readily available	☐ Up to date	☒ N/A
3. O&M and OSHA Training Records	☐ Readily available	☐ Up to date	☒ N/A
4. Permits and Service Agreements	☐ Readily available	☐ Up to date	☒ N/A
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
7. Groundwater Monitoring Records	☐ Readily available	☐ Up to date	☒ N/A
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records	☐ Readily available	☐ Up to date	☒ N/A
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A

IV. O&M COSTS

1. O&M Organization

☐ N/A ☐ Contractor for State
☒ Other: PRP ☐ Contractor for PRP

2. O&M Cost Records

☐ Readily available ☐ Up to date
☒ Funding mechanism/agreement in place
Original O&M cost estimate N/A ☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

None

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on map ☒ Gates secure ☐ N/A

Remarks: The site is enclosed within a locked fence. In addition, the site is located within the Controlled Industrial Area of Pearl Harbor which has very strict access controls.

B. Other Access Restrictions

1. Signs and other security measures ☒ Signs ☐ N/A

Remarks: Three different warning signs were observed at the northwest and north entrances to the building, as well as along the Seventh Street fence line. Two signs warned against lead contamination within the building and the third indicated the building is within a restricted area.

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	☒ No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	☒ No	☐ N/A

Remarks: None

Type of monitoring (e.g., self-reporting, drive by): Annual inspections (none to date)
Frequency: see above

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

Responsible party/agency: NAVFAC Hawaii

Contact:

Name	Title	Date	Phone No.
Joel Narusawa	RPM	01/06/2014	808-471-1171 X 222

Reporting is up-to-date	☒ Yes	☐ No	☐ N/A
Reports are verified by the lead agency	☒ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☐ Yes	☒ No	☐ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A

Other problems or suggestions: LUC-specific signs have not been installed and monitoring wells still need to be decommissioned.

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: LUC-specific signage still needs to be installed.

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

2. Land use changes on site ☒ N/A

3. Land use changes off site ☒ N/A

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

B. Other Site Conditions ☐ N/A

Remarks: The roads providing access to the site are in fair to good condition

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

X. OTHER REMEDIES

No bare soil was observed within the building; all unpaved areas were observed with a concrete cover.

XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy
Concrete cover was installed over bare soil within the building to prevent exposure to contaminated soil. No signs of unauthorized excavation or other construction activities were observed. Locked gates restrict access to the building. The remedy appears to be functioning as expected.
B. Adequacy of O&M
LUC-specific signs still need to be installed, but current warning signs indicate lead hazards are present within the building. Monitoring wells are scheduled for decommissioning.
C. Early Indicators of Potential Remedy Failure
None identified.
D. Opportunities for Optimization
None identified.

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Attachment B: Site Photographs

Photograph No. 1: Overview of Bldg. 6 site, looking south.

Photograph No. 2: Sign at north entrance of building indicating lead hazards exist within the building.

Photograph No. 3: View of pits and unpaved surfaces within Bldg. 6 that were covered in concrete.

Photograph No. 4: View of vault within Bldg. 6 that was covered in concrete.

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Attachment C: Interview Forms

INTERVIEW RECORD

Site Name: Bldg. 6 Foundry **DOH RPM:** Maria Reyes	**EPA ID No.:** HI4170090076
Subject: Five-Year Review Information Survey	**Time: 0930** **Date: 11/14/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Maria Reyes	**Title:** Regulatory Project Manager	**Organization:** DOH-HEER
Telephone No.: 808-586-4249 **Fax No.:** — **E-Mail Address:** maria.reyes@doh.hawaii.gov	**Street Address:** 919 Ala Moana Boulevard, Rm 206 **City, State, Zip:** Honolulu, Hawaii 96814	

Summary of Conversation

1. How long have you been familiar with the project site?
   Since late 2010 when they were in the Draft Final RI/FS stage.
2. What is your overall impression of the project?
   Inside the building the floor isn't completely paved. Those open/unpaved areas have high levels of metals and I think they were going to backfill some areas and cover some areas with concrete. The building is not used regularly.
3. Is the remedy functioning as expected? How well is the remedy performing?
   The remedy chosen will be good for protecting human health and the environment.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No, none of those. DOH doesn't visit routinely; we only visit with the EPA when they schedule a visit.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   Not yet because they are just installing the cap right now.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   None right now.

INTERVIEW RECORD

Site Name: Bldg. 6 Foundry **EPA RPM:** Christopher Lichens	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1030**	**Date: 11/12/13**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Chris Lichens	**Title:** Regulatory Project Manager	**Organization:** EPA
Telephone No.: 415-972-3149 **Fax No.:** **E-Mail Address:** lichens.christopher@epa.gov	**Street Address:** 75 Hawthorne Street **City, State, Zip:** San Francisco, CA 94105	

Summary of Conversation

1. How long have you been familiar with the project site?
   About 4 years
2. What is your overall impression of the project?
   I think it is going fine.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes. Although, I did have a conversation with Joel [Narusawa, Navy RPM] *regarding an issue with portions of the roof falling in.*
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Have there been any of the following? If so, please give details.
   - site visits, inspections, reporting activities, etc. conducted by EPA
   - complaints, violations, or other incidents related to the site requiring a response by your office
   - community concerns regarding the site or its operation and administration
   - events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities

   No, just the incident regarding the safety issue with the roof.
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
7. Do you have any comments, suggestions, or recommendations regarding the project?
   No.

INTERVIEW RECORD

Site Name: Building 6 **Navy RPM:** Joel Narusawa	**EPA ID No.:** HI4170090076	
Subject: Five-Year Review Information Survey	**Time: 1505**	**Date: 01/06/14**
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** N/A	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Teresa Quiniola	**Title:** Environmental Scientist	**Organization:** AECOM **Street Address:** 1001 Bishop Street **City, State, Zip:** Honolulu, HI 96813

Individual Contacted:

Name: Joel Narusawa	**Title:** Remedial Project Manager	**Organization:** Navy
Telephone No.: 808-471-1171 ext. 222 **Fax No.:** — **E-Mail Address:** joel.narusawa@navy.mil	**Street Address:** 400 Marshall Road **City, State, Zip:** JBPHH, HI 96860-3139	

Summary of Conversation

1. How long have you been familiar with the project site?
   Since 2009.
2. What is your overall impression of the project?
   Good.
3. Is the remedy functioning as expected? How well is the remedy performing?
   Yes, but remedial action is still in progress. The LUC signs and well decommissioning has not been done yet.
4. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
   N/A.
5. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities, including LUC inspections.
   Periodic inspections have been done to check on site.
6. Have there been unexpected costs or difficulties at the site in the last five years (or since the ROD was signed? Please provide details.
   The work has taken too long to finish because we have experience some delays, including regulator delays.
7. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.
8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   No.
9. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
   No.
10. Do you have any comments, suggestions, or recommendations regarding the project?
    No.

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Certification of Protectiveness

CERTIFICATION OF PROTECTIVENESS

Based on the information provided in this Five-Year Review Report, the Department of the Navy certifies that the remedies selected for the following Pearl Harbor Naval Complex (PHNC) National Priorities List (NPL) land use control (LUC) sites on Oahu remain protective of human health and the environment:

- Ford Island Landfill
- Building 284 and Former Buildings 80 and 302
- Various Transformer Sites
- Shoreline Site Northwest of Dry Dock #3
- Former Pearl City Junction
- Building 6

A protectiveness determination of the remedy at the 4th Street Coral Pit will be deferred until the ROD is signed and the remedy is implemented. It is expected that the ROD will be signed in 2014 and a protectiveness determination will be made once the remedy is implemented.

I hereby approve the First Five-Year CERCLA Review of Seven PHNC NPL sites.

30 SEP 2014

S. KEEVE
Captain, U.S. Navy
Commander, Joint Base Pearl Harbor-Hickam

Date

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Response to Comments/Concurrence

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Response to Comments/Concurrence

Attachment A: DOH

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LINDA ROSEN, M.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:
14-214-SPM

May 12, 2014

Ms. Jan Kotoshirodo
Naval Facilities Engineering Command, Hawaii
400 Marshall Road, Building X11
Pearl Harbor, HI 96860-3139

Facility/Site: PHNC, Ford Island Landfill
PHNC, Ford Island Building 284
PHNC, Ford Island Building 80 & 302
PHNC, Transformer Site TD-10
PHNSY, Asbestos Contaminated Site N-W DD3
PHNSY, Foundry, Building 6
NAVMAG West Loch, 4th Street Coral Pit Landfill
Pearl City Junction

Subject: Review of Draft First Five-Year CERCLA Review of Seven Pearl Harbor Naval Complex National Priorities List Sites, JOINT BASE PEARL HARBOR-HICKAM, OAHU, HAWAII

Dear Ms. Kotoshirodo:

The Hawaii Department of Health Hazard Evaluation and Emergency Response (HEER) Office has reviewed the five year review for the seven sites and has no substantive comments at this time. Please send the finalized document to the HEER office at your earliest convenience. Should you have any questions concerning the above please feel free to contact me at 586-7574.

Sincerely,

Steven P. Mow
Remedial Project Manager
Hazard Evaluation and Emergency Response Office

First Five-Year CERCLA Review
of Seven PHNC NPL Sites, JBPHH, Oahu, Hawaii

Response to Comments/Concurrence

Attachment B: EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

September 30, 2014

Ms. Janice Fukumoto
Naval Facilities Engineering Command, Hawaii (EV)
400 Marshall Road (Building X-11)
JBPHH, Hawaii 96860-3139

Subject: Final First Five Year Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Review of Seven Pearl Harbor Naval Complex National Priorities List (NPL) Sites, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii, September 2014

Dear Ms. Fukumoto:

The U.S. Environmental Protection Agency, Region 9 (EPA) has reviewed the subject document and agrees with the findings, conclusions, and recommendations provided in the document, and concurs with the Navy that the remedies remain protective of human health and the environment under the current land use, and exposure pathways that could result in unacceptable risk are being controlled through implementation of institutional controls and monitoring.

EPA notes that the protectiveness statement for the 4th Street Coral Pit site will be deferred until the remedy is implemented. We also note that the remedy for the Former Pearl City Junction site is protective in the short term, but that a Remedial Action Work Plan, as well as deeds and covenants, needs to be finalized and implemented in accordance with the Land Use Controls to continue to prevent exposure to soils with slightly elevated contaminant concentrations.

If you have any questions regarding this letter, please feel free to call Chris Lichens of my staff at (415) 972-3149, or contact him by email at lichens.christopher@epa.gov.

Sincerely,

Angeles Herrera
Assistant Director, Superfund Division
Federal Facility and Site Cleanup Branch

cc: Ms. Maria Reyes, DOH

From: Lichens, Christopher <Lichens.Christopher@epa.gov>
Sent: Wednesday, August 13, 2014 10:42 AM
To: Kotoshirodo, Jan H CIV NAVFAC HI, OPHEV3
Cc: Baxley, Dean; Quiniola, Teresa
Subject: RE: RTCs - Draft Five Year CERCLA Review of Seven Pearl Harbor Naval Complex National Priorities List (NPL) Sites, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii, March 2014

Jan, the RTCs look fine. EPA has no further comments. Thanks,

Chris

-----Original Message-----
From: Kotoshirodo, Jan H CIV NAVFAC HI, OPHEV3 [mailto:jan.kotoshirodo@navy.mil]
Sent: Wednesday, August 13, 2014 1:24 PM
To: Lichens, Christopher
Cc: 'Dean Baxley (E-mail)'; Quiniola, Teresa
Subject: RTCs - Draft Five Year CERCLA Review of Seven Pearl Harbor Naval Complex National Priorities List (NPL) Sites, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii, March 2014

Hi Chris-

Attached is our RTCs for EPA's comments on the PHNC 5-yr review. Also included with the RTCs is a revised version of the summary table of recommendations. For this table, we made a few more edits (shown in red), in addition to adding a column with projected completion dates (requested by EPA).

Your review/concurrence on these RTCs is requested by next Thurs Aug 21. To meet our deadline for signing the 5-yr review by end of Sep, I will need to provide our JBPHH Commander with our final version by the first week of September.

Please let me know if you have any questions or concerns.

Thanks-
jan

-----Original Message-----
From: Lichens, Christopher [mailto:Lichens.Christopher@epa.gov]
Sent: Wednesday, July 16, 2014 3:17 AM
To: Kotoshirodo, Jan H CIV NAVFAC HI, OPHEV3
Cc: 'Dean Baxley (E-mail)'; Quiniola, Teresa
Subject: RE: Draft Five Year Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Review of Seven Pearl Harbor Naval Complex National Priorities List (NPL) Sites, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii, March 2014

Jan,

Those comments are both from EPA headquarters and are intended as suggestions. Having said that, I think the table you created (second tab) would be fine for future five year reviews.

Increasing the font and/or decreasing the level of detail on the page vii table would make it easier to read.

Thanks,

Chris

-----Original Message-----

From: Kotoshirodo, Jan H CIV NAVFAC HI, OPHEV3 [mailto:jan.kotoshirodo@navy.mil]
Sent: Tuesday, July 15, 2014 5:49 PM
To: Lichens, Christopher
Cc: 'Dean Baxley (E-mail)'; Quiniola, Teresa
Subject: RE: Draft Five Year Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Review of Seven Pearl Harbor Naval Complex National Priorities List (NPL) Sites, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii, March 2014

Hi Chris-

A couple questions on EPA's comments on the Draft PHNC 5-yr Review:

1. EPA General Comment 2: The first tab of the attached workbook ("EPA CERCLIS Site vs OU Data") is an EPA site/OU crosswalk table that Janice prepared in 2011. This info was requested by NAVFAC HQ to 'harmonize' the Navy sites/EPA OUs. The green highlights are the 6 "OUs" that are included in the current 5-yr review. I created the second tab ("2014_PHNC_5yrRev_crosswalk") to trim the info down to the 6 OUs. Is the this the second tab ("2014_PHNC_5yrRev_crosswalk") the type of crosswalk table you would like to see in the 5-yr review?

2. EPA General Comment 4: The comment notes that "the Table on page vii is difficult to read." Could we get some clarification or specific comments on what EPA would like to change? Is it the level of detail, or format of the table? If so, is there an example that you could provide?

Thanks-
jan

-----Original Message-----
From: Lichens, Christopher [mailto:Lichens.Christopher@epa.gov]
Sent: Thursday, July 03, 2014 11:05 AM
To: Fukumoto, Janice L CIV NAVFAC HI, EV3; Kotoshirodo, Jan H CIV NAVFAC HI, OPHEV3
Cc: maria.reyes@doh.hawaii.gov
Subject: Draft Five Year Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Review of Seven Pearl Harbor Naval Complex National Priorities List (NPL) Sites, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii, March 2014

Janice and Jan,

EPA's comments regarding the subject document are attached. Please let me know if you have any questions.

Thanks,

Chris

Project Title: Draft Five-Year Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Review of Seven Pearl Harbor Naval Complex National Priorities List (NPL) Sites
Location: Joint Base Pearl Harbor-Hickam, Oahu, Hawaii
Reviewer: Chris Lichens, EPA Region IX
Date: July 2014

Item	Section No.	Comment
1	General	The issues, recommendations, and follow-up actions tables should include specific dates when recommendations will be implemented. Please add another column to the table with the dates.

Response: An additional column indicating specific anticipated dates when recommendations will be implemented has been added to the Summary Table (Attachment A). Also, the Navy has made some additional clarifications to the *Recommendations and Follow-up Actions* for the Ford Island Landfill, Shoreline Site Northwest of Dry Dock #3, and Former Pearl City Junction.

Item	Section No.	Comment
2	General	It would be helpful to add a “cross walk table” that identifies the OU for each site.

Response: The following table has been added to the *Executive Summary* and the first paragraph of Section I to list the Five-Year Review sites and the associated EPA OU and site designations:

Table ES-1: Seven PHNC LUC NPL Sites Undergoing Five-year Review

Navy Site Name	Navy Site Location	EPA OU	EPA OU Name
Ford Island Landfill	Ford Island	05	Ford Island Landfill
Bldg. 284 and Former Bldgs. 80 and 302	Ford Island	12	Ford Is. HazSites (Sans LF)
Various Transformer Sites (TD-10, K-14 and W-4/W-5)	TD-10 [Ford Island], K-14 [Halawa Main Gate], W-4/W-5 [Waipio Peninsula]	01	Sitewide
Shoreline Site Northwest of Dry Dock #3	Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility [PHNSY & IMF]	06	NSY Dry Dock #3
4th Street Coral Pit	West Loch Annex	24	West Loch 4th St. Coral Pit LF
Former Pearl City Junction	Pearl City	14	Pearl City Junction
Bldg. 6	PHNSY & IMF	17	NSY Bldg. 6, Former Foundry

Item	Section No.	Comment
3	General	Since the Five—Year Review Summary table is a summary of the entire site, the table should not indicate that the site has reached construction completion.

Response: On the Five-Year Review Summary Form, under Site Status, the construction completion date has been revised to indicate ‘not applicable at this time’.

Item	Section No.	Comment
4	General	The table on page vii is difficult to read.

Response: Table ES-2, the overview table that begins on Page vii, has been reformatted and is presented in Attachment B for your review.

Item	Section No.	Comment
5	General	The document should provide the date the site was listed on the NPL.

Response: The following sentence has been added to the last paragraph of Section I, as the second sentence: “*The NPL listing for PHNC was proposed on 29 July 1991 and finalized on 14 October 1992.*”

Item	Section No.	Comment
6	Introduction, 1.5, Report Structure	EPA concurs with the Navy’s effort to synchronize the FYR process for all sites and activities on the installation. The report structure is well organized and easy to follow. However, there are some redundancies that could be eliminated when the next FYR is written. As examples, the sections on Community Involvement, Progress Since Last FYR, and Next FYR are all the same.

Response: Although *Progress Since the Previous Five-year Review Report* is redundant, it will be maintained as Section 4 because site-specific progress will need to be included in subsequent Five-Year reviews. However, the *Community Involvement* and *Next Review* sections have been moved from the site-specific sections to the *Introduction* Section after Section I.4.

Project Title: Draft Five-Year Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Review of Seven Pearl Harbor Naval Complex National Priorities List (NPL) Sites
Location: Joint Base Pearl Harbor-Hickam, Oahu, Hawaii
Reviewer: Chris Lichens, EPA Region IX
Date: July 2014

Item	Section No.	Comment
7	Summary Form	The author should be listed at the Navy rather than the contractor.
Response: In the summary form, the author name has been revised to NAVFAC Hawaii.		
8	Protectiveness Statement	The Protectiveness Statement for the Pearl City Junction site says the remedy is protective of HH&E. However, it adds that a RAWP needs to be finalized and implemented in accordance with the LUCs to continue to prevent exposure. Given the information from the Technical Assessment and RPM interviews, EPA suggests the Navy modify the Protectiveness Statement. According to EPA's FYR policy, the answer to Technical Assessment Question C: *"Has any other information come to light that could call into question the protectiveness of the remedy?"* should be "yes." As for the Protectiveness Statement itself, the report should say the remedy is: *Protective in the short-term; however, in order for the remedy to be protective in the long-term, follow-up actions need to be taken.* The actions to be taken are already included in the report. A protectiveness statement for the 4th Street Coral Pit cannot be made if a remedy has not been selected. Therefore, the report should be silent on it until a remedy is selected.
Response: Under Section 6, Question C, the content of the assessment column has been revised to state, "*Yes, a RAWP needs to be finalized and implemented in accordance with the LUCs to continue to prevent exposure.*" Under Section 9, the first sentence has been revised as follows: "*The remedy at the Former PCJ, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment in the short term because no evidence of exposure to contaminated soil has occurred. However, in order for the remedy to be protective in the long-term, follow-up actions need to be taken.*" Since the remedy for the 4th Street Coral Pit has not been finalized, a *protectiveness deferred* determination has been made in accordance with EPA memorandum OSWER 9200.2-111. Once the ROD is signed and the remedy has been made final, a Five-Year review addendum will be completed to document the protectiveness determination.		

Attachment A
Revised Summary Table

Summary of Five-Year CERCLA Review of Seven PHNC NPL LUC Sites

Issues	Recommendations and Follow-up Actions	Anticipated Date of Implementation	Protectiveness Statement
Ford Island Landfill			
Although soil vapor sampling was incorporated into a revised long-term monitoring plan finalized in July 2013 (AECOM 2013), the results were not available for review.	Soil vapor sampling will be conducted during the next annual sampling event scheduled for August/September 2014. During the next five-year review, soil vapor results should be evaluated.	August 2014 (sampling); September 2019 (further evaluation)	The remedy at the Ford Island Landfill site, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. The containment system and its components should be maintained to prevent future exposure. Although no buildings are currently at the site, the vapor intrusion pathway should be evaluated to ensure future protectiveness. No changes in land use are expected in the foreseeable future.
Currently groundwater monitoring is scheduled to be conducted on an annual basis. However, groundwater monitoring results for 2013 were not available for review. Based on previous groundwater monitoring data, metals concentrations appear to be decreasing.	During the next five year review, the sampling frequency and locations should be evaluated to optimize the monitoring plan.	September 2019	
Unauthorized driving on the landfill may compromise the future integrity of the soil cap.	If unauthorized driving continues to occur and damage to the cap is observed, consider installing chains and bollards or a similar restriction to prevent vehicle access via the shallow portion of the swale.	Ongoing	
Vegetation growing in swale outlets may affect the discharge of surface runoff from the site.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Vegetation growing in rip-rap could affect shoreline protection.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Ongoing issues with the sprinkler system include the disabling of individual sprinkler heads by recreational visitors and fishermen. Exposed soil and dry grass was observed during the site inspection.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Monitoring well MW-6 was observed without a lock; other wells had vaults that were missing bolts.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Building 284 and Former Buildings 80 and 302			
The coral gravel cover described in the ROD and RAWP appears to have been replaced by asphalt.	The NAVFAC RPM indicated that the work done to replace the coral gravel was done with the proper notifications and no soil six inched below ground surface was disturbed. However, the LUC work plan and annual inspection forms need to be updated to indicate that the asphalt cover has replaced the coral gravel and will need to be verified and inspected.	September 2015	The remedy at Bldg. 284 and Former Buildings. 80/302, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. No changes in land use are expected in the foreseeable future.
The long-term monitoring plan was finalized in July 2013 (AECOM 2013), and the first sampling event was completed in February 2014; Therefore, the results were not available for review.	During the next five-year review, groundwater sampling results from Bldg. 284 should be evaluated.	September 2019	
Exposed soil and dry grass may eventually compromise the integrity of the soil caps.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Vegetation growing in rip-rap at the Bldg. 284 site may affect the protectiveness of the shoreline.	Continue to monitor and address this item as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Minor cracks and holes in pavement at the Former Bldgs. 80/302 site.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Fishing and dumping were observed at the shoreline for Bldg. 284.	Continue to monitor and address these items as part of the ongoing long-term monitoring program (AECOM 2013).	Ongoing	
Various Transformer Sites			
No LUC signage is present at the TD-10 transformer site. In addition, for the LUC area at TD-10, a large PCB mark is required in accordance with 40 CFR §761.45.	Install PCB warning signs to prevent ground disturbance and warn of a chemical hazard.	September 2015	The remedies at the TD-10, K-14, and W-4/W-5 transformer sites, a PHNC NPL site on Oahu, Hawaii, are protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. No changes in land use are expected in the foreseeable future.
Shoreline Site Northwest of Dry Dock #3			
Orientation of LUC signage does not clearly indicate the LUC area boundaries.	Reposition or reword signs to more clearly indicate the bounds of the LUC area.	September 2015	The remedy at the Shoreline Site Northwest of Dry Dock #3, a PHNC NPL site on Oahu, Hawaii, is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. No changes in land use are expected in the foreseeable future.
Vegetation growing in shoreline area may compromise shoreline protection.	~~Remove~~ Monitor vegetation as necessary to ensure shoreline protection.	Ongoing	
Minor cracks and holes in concrete and pavement.	Pavement should be regularly monitored and repaired as necessary to ensure that larger cracks (which could create an exposure concern) do not develop.	Ongoing	
4th Street Coral Pit			
The ROD has not been finalized and the remedy has not been implemented, including LUCs and signage.	Once the ROD has been signed, the LUCs should be implemented. LUC signage should be installed to specifically warn of contaminated soil and prohibit unauthorized digging.	TBD	A protectiveness determination of the remedy at the 4th Street Coral Pit, a PHNC NPL site on Oahu, Hawaii cannot be made at this time. The determination will be deferred until the ROD is signed and the remedy is implemented. It is expected that the ROD will be signed in early 2014 and a protectiveness determination will be made once the remedy is implemented.

Summary of Five-Year CERCLA Review of Seven PHNC NPL LUC Sites

Issues	Recommendations and Follow-up Actions	Anticipated Date of Implementation	Protectiveness Statement
Former Pearl City Junction			
The LUCs may not have been properly conveyed to the current landowners.	Inform the landowner of the LUCs and the need to adhere to Navy notification requirements prior to ground disturbance activities. The deed or environmental covenants should be revised as necessary to incorporate LUCs. Consider installing signs along the perimeter of the LUC areas and the front entrance gate to notify anyone onsite of the LUC areas and restrictions.	Pending discussion and agreement with the current landowners on land use restrictions/implementation	The remedy at the Former PCJ, a PHNC NPL site on Oahu, Hawaii is protective of human health and the environment because no evidence of exposure to contaminated soil has occurred. However, exposure pathways that could result in unacceptable risks need to be controlled. A RAWP, as well as the deeds and covenants, need to be finalized and implemented in accordance with the LUCs to continue to prevent exposure to contaminated soils at the site. No changes in land use are expected in the foreseeable future.
A remedial action work plan has not been finalized.	A remedial action work plan may help ensure the remedy is being implemented as necessary.	Pending discussion and agreement with the current landowners on land use restrictions/implementation	
Annual LUC inspections were not conducted.	After completion of the RAWP, LUC inspections should be documented on an annual basis to ensure the continued effectiveness of land use restrictions at the site.	Pending discussion and agreement with the current landowners on land use restrictions/implementation	
~~Unauthorized dumping of rubbish was observed along the south fence of the site and near the southeast corner of the Public Storage building.~~	~~The rubbish and debris should be cleared and appropriate security measures implemented to prevent future unauthorized activities.~~		
Since Hickam Air Force Base and Pearl Harbor combined, both LUC sites, Former PCJ and ST18-A, are overseen by the Navy.	~~Combining efforts for two overlapping LUC sites for cost savings and efficiency of LUC required implementation~~ Combining efforts for LUC implementation is not recommended because Former PCJ is part of the PHNC NPL, and ST18A is non-NPL.	NA	
Building 6			
LUC warning signs were not installed as of the date of this report and groundwater monitoring wells still needed to be decommissioned.	LUC warning signs should be installed and groundwater monitoring wells no longer in use at the site should be decommissioned.	Completed March 2014	The remedy at the Bldg. 6 site, a PHNC NPL site in on Oahu, Hawaii is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. No changes in land use are expected in the foreseeable future.

Attachment B
Table ES-2

Table ES-2: Overview of Seven PHNC NPL LUC Sites Undergoing Five-Year Review

Description	Date of Decision Document	COCs Remaining on Site at Issuance of Decision Document		Selected Remedy
		Medium	Constituent(s)	
Ford Island Landfill				
The Ford Island Landfill was used from the mid-1930s until the late 1960s for disposal activities that involved dumping and burning wastes generated by maintenance activities performed on Ford Island. After the aforementioned disposal activities were discontinued, bulk debris was disposed of and covered with soil until these activities were also discontinued in 1982. When the Navy discontinued landfill dumping, they covered approximately 80 percent of the landfill with a final layer of soil.	27 September 2011 [a]	Soil	Antimony, arsenic, cadmium, copper, lead, zinc, Aroclor-1260, benzo(b)fluoranthene, benzo(a)anthracene, benzo(a)pyrene, dibenz(a,h)anthracene	LUCs (including long-term monitoring and landfill containment system [vegetative cover, irrigation system, and concrete drainage trench] maintenance)
		Groundwater	Arsenic, copper, mercury, nickel, zinc	
		Surface Water	Copper, lead, mercury, nickel	
Bldg. 284 and Former Bldgs. 80/302				
Bldg. 284 was built in 1946 and was used as an aviation engine test cell facility. An unpaved sloped area northwest of Bldg. 284 contained exposed metal and concrete construction debris. In 2006, a permeable vegetative soil cap and shoreline revetment was built over the metals-containing soil to prevent direct exposure to human and ecological receptors and to deter erosion of soil fill into the harbor. Bldgs. 80 and 302 were built sometime prior to 1942 and used as a garage and vehicle maintenance area. A two-phase TCRA was completed in 2005 through 2006 to excavate surface soil containing elevated metals concentrations and consolidate this soil on site under a 2-foot-thick vegetative soil cap in the grassy area east of Independence Street.	27 August 2009 [b]	Soil	Building 284: Antimony, arsenic, cadmium, copper, lead, mercury, zinc Former Buildings 80/302: Antimony, arsenic, cadmium, chromium, copper, lead, selenium, silver, thallium, zinc	LUCs (includes maintenance and inspection of the cap, and long-term monitoring of groundwater at Bldg. 284)
Various Transformer Sites				
Previous investigations at these transformers identified PCB-contaminated soil and concrete. A NTCRA was conducted to remove PCB-contaminated soil from the site, however PCB-contamination exceeding cleanup standards still remains at the sites. TD-10 is an inactive transformer located inside Bldg. S181, near the intersection of Yorktown Boulevard and Wasp Boulevard, within the Ford Island geographical study area (GSA). The concrete area at TD-10 containing PCB contamination was double-painted with epoxy encapsulant. K-14 is an active transformer in Bldg. S485, located south of Kuahua Avenue and adjacent to Bldg. 445, within the Halawa-Main Gate GSA. PCB-contaminated soil was covered with clean soil and an asphalt cap. W-4/W-5 is located off of Waipio Point Access Road and includes two active outdoor pad-mounted transformers, W-4 and W-5, which are co-located and considered a single site. PCB-contaminated soil was covered with clean soil, a gravel cap, and enclosed with a locked fence.	23 September 2010 [c]	Concrete, soil	PCBs	LUCs (including encapsulated concrete [site TD-10]), clean, backfilled soil and asphalt [site K-14]; and clean, backfilled soil and gravel cap [site W-4/W-5])

Description	Date of Decision Document	COCs Remaining on Site at Issuance of Decision Document		Selected Remedy
		Medium	Constituent(s)	
Shoreline Site Northwest of Dry Dock #3				
Initial investigations concluded that potential human health risk at the Shoreline Site existed because of the presence of asbestos. As a result, the Navy performed a TCRA, removing the ACM-containing soils down to a 1 percent asbestos fibers cleanup goal. During the removal, the Navy observed cement kiln bricks and weathered asbestos-containing cloth buried roughly 3 to 5 feet below ground surface. Residual ACM less than 1 percent in subsurface rubble may still pose a human health threat to worker health and result in other possible human exposure if redevelopment is allowed in the future. Therefore, a concrete cap was installed to minimize the potential for asbestos at the site to become airborne.	14 July 2010 [d]	Soil	Asbestos	LUCs (including concrete cap and long-term maintenance)
4th Street Coral Pit				
In the 1930s, the site was excavated as a source of coral for use as road construction materials. During World War II, the Coral Pit was used as a waste disposal site for solvent cans, paint sludges, paint cans, empty transformers, acid-filled automotive batteries, and dunnage (NEESA 1983). The Coral Pit was partially backfilled with coral rock by the U.S. Army Corps of Engineers in the mid 1970s to preclude further disposal of potentially hazardous materials. Subsequent to covering the old Coral Pit, scrap metal disposal was permitted at the site, although unauthorized disposal of other materials reportedly continued (NEESA 1983). The site remained undeveloped after its closure, and the current Coral Pit surface remains approximately 3 to 7 feet below the surrounding grade. The types of waste observed at the 4th Street Coral Pit during the remedial investigation consisted predominantly of scrap metal, construction debris, and other inert or non-hazardous waste. A remedial investigation found arsenic detected above residential and industrial screening levels within surface soil across the site. Therefore, arsenic was identified as the primary chemical of concern at the 4th Street Coral Pit. A feasibility study was performed to address the former solid waste disposal area and chemical of concern at the 4th Street Coral Pit using the presumptive remedy approach (AECOM 2012).	Pending 2014 [e]	Soil	Arsenic	LUCs
Former Pearl City Junction				
The Navy's Fleet and Industrial Supply Center (FISC) acquired the PCJ property in 1944, and constructed four warehouse buildings at the site. In 1962, the Defense and Reutilization Marketing Office (DRMO) began using the site to store lime, fuel, hydraulic fluid, photographic chemicals, and paints, among other materials. All warehouse buildings have since been demolished. Two soil removal actions for dieldren- and PCB-containing soils have been conducted, and the Air Force has removed a fuel pipeline along the northern boundary of the site. However, subsurface soil containing PCBs and dieldrin remains onsite at concentrations that could pose unacceptable risk to humans if unlimited or unrestricted use of the site is allowed.	29 September 2010 [f]	Soil	Dieldrin, PCBs	LUCs

Description	Date of Decision Document	COCs Remaining on Site at Issuance of Decision Document		Selected Remedy
		Medium	Constituent(s)	
Building 6				
The Bldg. 6 Foundry Shop was constructed in 1915 to cast new or replacement parts for naval vessels. Foundry operations began during World War I and reached a peak during and shortly after World War II. More recently, foundry operations were limited to casting small replacement metal parts. Casting operations were conducted at multiple locations throughout Bldg. 6. Most of the foundry equipment is still in place; however, foundry operations ceased altogether in 1997.	24 July 2012 [g]	Soil	Metals, PAHs, and PCBs	LUCs (including concrete cover and long-term management)

ACM asbestos-containing material
DON Department of the Navy
DRMO Defense Reutilization Marketing Office
FISC Fleet and Industrial Supply Center
GSA geographical study area
PCB polychlorinated biphenyl
TCRA time-critical removal action

[a] Department of the Navy (DON). 2011. *Record of Decision, Ford Island Landfill, Joint Base Pearl Harbor-Hickam, Ford Island, Oahu, Hawaii.* JBPHH, HI: Naval Facilities Engineering Command, Pacific. September.
[b] Department of the Navy (DON). 2009. *Final Record of Decision, Building 284 and Former Buildings 80 and 302, Pearl Harbor Naval Complex, Oahu, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. August.
[c] Department of the Navy (DON). 2010. *Record of Decision, Three Transformer Sites (TD-10, K-14, W-4/W-5), Pearl Harbor Naval Complex, Oahu, Hawaii*. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. August.
[d] Department of the Navy (DON). 2010. *Record of Decision, Shoreline Site Northwest of Dry Dock #3, Pearl Harbor Naval Facilities Engineering Command Shipyard and Intermediate Maintenance Facility, Pearl Harbor, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. March.
[e] At the time of publication of this report, the record of decision for the 4th Street Coral Pit had not been finalized. However, it is anticipated to be final prior to the finalization of this review.
[f] Department of the Navy (DON). 2010. *Record of Decision, Former Pearl City Junction, Pearl City, Oahu, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. September.
[g] Department of the Navy (DON). 2012. *Record of Decision for Building 6. Joint Base Pearl Harbor-Hickam, Pearl Harbor, HI*: Naval Facilities Engineering Command, Pacific. June.